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## SERIES A: AGRICULTURAL.

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JONES (Lynds). **Some Records of the Feeding of Nestlings.**—*Wilson Bulletin, Oberlin, Ohio*, no. 83, xxv, no. 2, June 1913, pp. 67-71.

Four nestlings of the field sparrow (*Spizella pusilla pusilla*) were observed during a period of more than nineteen hours to receive 237 pieces of food which comprised 154 Geometrid larvae, 45 grasshoppers and 24 moths. The food was secured within a radius of 50 yards of the nest, mostly from the grass of the orchard, but occasionally from apple trees.

Four nestlings of the song sparrow (*Melospiza melodia melodia*) received 300 pieces of food of which 178 were Geometrid larvae, 46 grasshoppers, 11 bugs, 3 moths and 31 unknown.

Of 637 pieces of food brought to the nestlings of the house wren (*Troglodytes aëdon aëdon*) 161 were Geometrid larvae, 141 leafhoppers, 112 young grasshoppers, 56 bugs, 42 spiders, 29 crickets, 10 moths, and 5 ants.

BURRILL (A. C.). **Quails as Insect Eaters.**—*Wilson Bulletin, Oberlin, Ohio*, no. 83, xxv, no. 2, June 1913, pp. 99-100.

In a letter to the editor of the Wilson Bulletin the writer says that the quail should become a farm bird, as it eats about five pounds of insect pests and 9·75 lbs. of weed seeds yearly, a work valued at from $10 to $20 a year per bird. Wisconsin's quail were being shot for game when they were most needed to help to save the wheat crop from entire collapse in the chinch bug epidemic of the early seventies. A single quail has eaten 5,000 chinch bugs at a meal. The annual loss in Wisconsin owing to insects is estimated at from $13,000,000 to $40,000,000. The value of birds and insectivorous animals slaughtered in Wisconsin in 1912 was $1,000,000, and already the bird population in this State is at least 20 per cent. less than it was.

COLLINGE (W. E.). **The Food of some British Wild Birds: A Study in Economic Ornithology.** Dulau & Co., London, 1913, 109 pp. 8vo. Price 4*s*.

At a time when increasing attention is being paid to the economic value of birds, a book which not only sums up previous records—there are 114 references in the bibliography—but sets forth in considerable detail the results obtained from observations both in the field and in the laboratory extending over the past eight years, must be welcomed. In all, the author made 3,048 post-mortems of adult birds, 312 post-mortems of nestling birds, and also examined large quantities of faeces and pellets; twenty-nine species of British wild birds were examined; of these, five are distinctly injurious, *viz.*, the house-sparrow, bullfinch, sparrow-hawk, wood-pigeon and stockdove; six are too plentiful and consequently injurious, *viz.*, missel-thrush, blackbird, greenfinch, chaffinch, starling and rook; one is injurious but not plentiful, *viz.*, the blackcap; the jay is to be regarded as neutral,

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and the remaining sixteen are beneficial, especially the owls, the wren and the plover. To take an example of the author's method of setting forth his results: The Blue Tit (*Parus coeruleus*) is discussed, with references to previous authors. The post-mortem records (38) in tabular form show the following benefits: Aphids occurred 6 times, scale-insects 16, apple-blossom weevil (*Anthonomus pomorum*) 3, fragments of beetles 7, fragments of lepidopterous larvae 20, fragments of Tineina 3, fragments of dipterous larvae 4, and gall-making insects (*Cynips*, etc.) 8 times. Injuries were: fruit pulp 7, fragments of wheat 4, fragments of bud-scales 5, and particles of apple rind 3 times. Neutral: fruit of birch 4, bits of grass 1, miscellaneous vegetable matter 6, and spiders 4 times. Then field observations, food of nestlings and the examination of faeces are discussed, and each record ends with a conclusion; in this case: "In spite of all that has been chronicled against this bird, I am of opinion that it is distinctly beneficial. The harm it does is comparatively insignificant when compared with the great benefits it confers." The relation of wild birds to forestry is briefly reviewed, and the subjects of bird protection and legislation are discussed. In clearly defining the precise economic position of the species of birds dealt with, the author has rendered a service not merely to the ornithologist, but to the economic entomologist as well.

Dyar (H. G.). **A Galleriine Feeding in Cacao Pods.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, i, May 1913, p. 59.

Two males and one female of *Tineopsis theobromae* g. n., sp. n., were bred from 'cacao beans' on the Pennsylvania Chocolate Company's premises at Pittsburgh, Pa., 8th January 1913.

Chatton (É.). **Septicémies spontanées à Coccobacilles chez le Hanneton et le Ver-à-soie.** [Septicaemia in the Cockchafer and Silkworm due to *Coccobacillus.*]—*C.R. Acad. Sci., Paris*, clvi, no. 22, 2nd June 1913, pp. 1707-1709.

At the suggestion of Dr. Roux, the author, in May 1912, experimented with *Coccobacillus acridiorum*, d'Hérelle, on cockchafers. The latter, if inoculated with the virus into their body cavity, died in from 24 to 48 hours. After a series of ten successive inoculations the virus was intensified so as to kill the cockchafer in between 12 to 24 hours. Females are generally more resistant than males. Contrary to d'Hérelle's experience with locusts, the cockchafers could not be infected with the virus by the mouth. From the beginning of the experiments the author noted a septicaemia independent of the *Coccobacillus acridiorum*, due to a specific organism, *Bacillus melolonthae*, which resembles that of d'Hérelle, but differs from it in being slightly longer and showing a fluorescence in the culture medium after 5 to 6 days. Up to 0·5 cc. of *C. acridiorum* injected into the general cavity of silk-

worms showed that the latter are by nature immune. *B. melolonthae* behaves in the same way in the silkworm as in the cockchafer, being virulent when injected and innocuous when taken into the alimentary canal. Further, a new bacillus, *B. bombycis*, was discovered in the silkworm, producing a daily mortality from septicaemia of from 5 to 10 in a generation of 2,000 silkworms. This microbe resembles *B. melolonthae* morphologically, but differs in the physiological character of not imparting a fluorescence to the culture jelly and in being more virulent than the two other species. *B. bombycis* seems less frequent in the alimentary tract of the silkworm than *B. melolonthae* in that of the cockchafer. The disease produced by *B. bombycis* in silkworms has hitherto escaped recognition. No external symptoms are noticed before death and the coccobacillosis, as the author terms the disease, is essentially different from the well-known flacherie and grasserie.

Essig (E. O.). **The Yerba Santa Mealy Bug** (*Pseudococcus yerbasantae*, **sp.n.**).—*Jl. of Entom. & Zool., Claremont, Cal.*, v, no. 2, June 1913, pp. 85-87, 2 figs.

This Mealy-Bug feeds upon the foliage of the yerba santa or mountain balm (*Eriodictyon californicum*); many of the plants were completely covered with the young and adult females and the egg-sacs. No adult males or their cocoons were collected. *P. yerba-santae* has only been found in the Sespe Canyon, Ventura Co., Cal. Two dipterous insects play a very important rôle in reducing its numbers: the larvae of the Syrphid fly (*Baccha lemur*, O.S.) preys upon the eggs and young, and the small internal parasite (*Leucopis bella*, Loew) upon the half-grown and adult females.

Smith (P. E.). **A Study of Some Specific Characters of the Genus** *Pseudococcus*.—*Jl. of Entom. & Zool., Claremont, Cal.*, v, no. 2, June 1913, pp. 69-84, 17 figs.

This paper is a continuation of a previous study (Ann. Entom. Soc. Am. iv, no. 3, pp. 309-327) and concerns the adult characters of five species of *Pseudococcus*, namely, *agrifoliae*, Essig, *crawii*, Cog., *obscurus*, Essig, *citri*, Risso, and *longispinus*, Targ.

Jack (R. W.). **Darkling Beetle Grubs Injurious to Tobacco.** [Tenebrionidae.]—*Dep. Agric., Salisbury, Rhodesia*, June 1913, Bull. no. 148, pp. 5, 2 pls.

The author says that the grubs of this beetle are generally referred to by tobacco growers as "wire worms" to which they have sufficient resemblance to justify the mistake. The larvae grow slowly and are difficult to rear in confinement, but one

species was bred through at the Agricultural Laboratory. The grubs are by no means an insignificant pest of tobacco in Rhodesia, and on certain occasions the injury done by them has been very serious. In one district a grower was obliged to abandon the attempt to cultivate tobacco on certain land as the plants were destroyed as soon as they were planted. There is more than one species and some grubs are evidently those of a large beetle, but the adults have not yet been obtained. The grubs eat the stem below the surface of the soil, sometimes completely severing it at 1 inch or 2 inches below the surface. Grubs collected in February made rough earthen cells towards the end of March and in April one which had been disturbed pupated on the surface of the soil. Adults emerged after the 24th April. The species bred out in the laboratory proved to be *Trachynotus griseus*.

The diet of the insects is varied; they will eat living vegetable matter and also dead and dried leaves, but they are strongly attracted by dead insects, even of their own species. They do not eat healthy living insects, even when powerless, but will devour injured pupae and appear to perform the function of scavengers. Although the grubs have been found destructive on sandy granitic soil and the beetles of *T. griseus* are common enough on the red dioritic soil about Salisbury, yet the grubs have never been observed to injure tobacco in the latter area.

There is no doubt that the large species takes at least two years to mature. The grubs are normally inhabitants of the grass veld and only attack tobacco seriously when the grass is ploughed and the land cultivated, depriving them of their only food. The author suggests that rotation of crops with tobacco should be useful, as the beetles are always liable to lay their eggs on fallows; on the better land this rotation is generally practised, and this may account for the fact that injury has not been noted on the red soil. The practise of using the same land for tobacco two years in succession and then allowing it to be overgrown with grass before using it again renders the crop always liable to this form of injury.

PEYRAN (—). **Contre les courtilières.** [Mole Crickets.] *L'Apiculteur*, lxvii, June 1913, pp. 216-217.

The author says that he has been able to save his plants in a very large vegetable garden from various pests by the use of bisulphide of carbon. Instead of using a soil injecting apparatus, which costs 60 francs, he made holes with a stake and by means of a graduated glass poured into each hole 10 cc. of bisulphide of carbon, closing the hole immediately with earth and ramming it down. He made these holes at a distance of 75 centimetres (2 ft. 6 in.) from one another, and in another part of his garden he made them as close as 50 centimetres (20 inches) without harm to his vegetables. Bisulphide not only destroyed numbers of ordinary pests, but was especially useful against mole crickets, which entirely disappeared from the garden.

TIMBERLAKE (P. H.). **Preliminary Report on the Parasites of *Coccus hesperidum* in California.**—*Jl. Econ. Entom., Concord, N.H.*, vi, no. 3, June 1913, pp. 293-303.

Formerly the soft scale, *Coccus hesperidum* was said to have been as destructive and as difficult to control in Californian citrus groves as the black scale, *Saissetia oleae*. At present it is comparatively harmless, probably owing to its inability to withstand the combined effects of fumigation and the recurrent attacks of parasites. Occasional alarming outbreaks, however, occur in fumigation districts, as fumigation is quite as fatal to the parasites as to the host. The worst infestation of the soft scale on record, at Riverside, Cal., took place on a small tract overrun by the Argentine ant, *Iridomyrmex humilis*, Mayr. This and other species of ants eagerly attend the soft scale for the sake of its copious secretion of honeydew, and there is reason to believe that they protect their provider from the attack of parasites, but this conclusion does not seem as yet to have been verified by observation.

The parasites of the soft scale observed in California during the past two years, arranged in order of their probable effectiveness, stand as follows: *Aphycus* sp. near *flavus*, How.; *Microterys flavus*, How.; *Coccophagus lecanii*, Fitch; *Coccophagus lunulatus*, How.; *Aphycus* sp. n. near *coquilletti*, How.

The *Microterys*, and sometimes *Aphycus* also, is attacked by no less than eight hyperparasites: *Coccophagus lecanii*, Fitch; *Pachyneuron* sp.; *Eusemion longipenne*, Ashm.; *Eusemion* sp. n.; *Perissopterus javensis*, How.; *Tomocera californica*, How.; *Cheiloneurus* sp. n.; and *Cerchysius* sp.

*Aphycus* sp. near *flavus* is a common parasite of *Coccus hesperidum* in California, and occasionally attacks small, immature specimens of *Saissetia oleae*. This *Aphycus* is able to pass through many generations in a year, as it develops from egg to adult in about eighteen days at summer temperature. The other new species of *Aphycus* is extremely rare and has been found only at Carpenteria, near Santa Barbara, and at Avalon, Catalina Island.

*Microterys flavus* is found throughout central and southern California, and is most abundant near Santa Barbara and San Diego. It has been reported also from Ontario, several Eastern States and Ceylon. Other recorded hosts in America are *Lecanium corni*, Bouché, and *Pulvinaria vitis*, L.; but in California it seems to attack only the soft scale as a rule. In cases of superparasitism, where there is a struggle for the possession of the host between *Microterys* and some other parasite such as *Aphycus*, the former is generally worsted, probably on account of its specialised larval habits. When the struggle has been between *Microterys* and *Coccophagus lunulatus*, in observed instances the *Microterys* has been starved, as it does not attack the *Coccophagus* larva or pupa, and the latter succumbs because of the premature death of the host. *Coccophagus lecanii* is generally a hyperparasite when it comes into conflict with *Microterys*, but one instance has been observed where it was superparasitic. In

this case the *Microterys* larva was overcome while still small, and *Coccophagus* developed as a primary parasite.

*Coccophagus lecanii* is common almost throughout California and is a frequent parasite of the soft scale, but when associated with *Aphycus* or *Microterys* it is not rarely hyperparasitic.

*Coccophagus lunulatus* is always a primary parasite, and also attacks immature scales of *Lecanium corni* and *Saissetia oleae*. The original record which states that it was reared from *Chrysomphalus aurantii*, Mask., is undoubtedly incorrect, as its peculiar life-history practically precludes the possibility of its parasiting any Diaspine scale. As a parasite of *Coccus hesperidum* it prefers half-grown scales and rarely attacks those that have become mature.

*Cerchysius* sp., although nowhere abundant, is rather frequently found under black scale near Santa Barbara and San Diego. As a parasite of *Microterys flavus* on the soft scale it is extremely rare, and has been found only once at San Diego and once at Santa Barbara.

*Eusemion longipenne* was described by Ashmead as being reared from *Lecanium* on oak in Florida. In California the species has been found at Santa Barbara and Carpenteria, and has been reared in small numbers as a parasite of *Microterys flavus*.

Considering that the soft scale is defenceless it is surprising that only one predaceous insect, *Rhizobius ventralis*, has been observed actually to feed on it in Southern California.

Castellano (José C.). **Mosca del durazno.** [The Peach Fly.]—*Gaceta Rural, Buenos Aires*, vi, April 1913, p. 783.

The author says that this fly (*Chyliza persicorum*) does much damage to fruit crops in Argentina. It generally appears at the end of February and during March, finding favourable conditions for its development in windfalls or in stacked fruit, especially those which have suffered slight damage and present cracks and bruises, the insect apparently seeking the fruit juices. The eggs are laid in these cracks and in damp seasons there may be several generations. The author gives the following as useful methods of combating the insects:—(1) to plant the trees in such a way that they shall have plenty of air and light, and that the branches of neighbouring trees shall not cross or touch one another; (2) to cut the trees in the form of a vase leaving only three or four main branches; in this way the fruit will dry more quickly and will not present such favourable conditions for oviposition by the insects; (3) never to make heaps of fruit under the trees; (4) to collect all windfalls and keep the soil under the trees thoroughly clean and free from weeds; (5) if the fruit, after gathering, must remain for several days in store near the orchard, it should be kept in a dark and thoroughly dry place, as the insects have an objection to darkness; (6) hanging pots in the trees full of honey poisoned with 1 per cent. of arsenic has been found useful, and Cellis' formula for spraying is also recommended:—Molasses 65 parts, honey 31 parts, glycerine 2 parts,

arsenate of soda 2 parts, thoroughly mixed and made up with water to a 10 per cent. solution; from 300 to 400 grms. ($\frac{3}{4}$ to 1 pint) are said to suffice for one tree. If after this spraying treatment no rain has fallen, the fruit should be thoroughly washed or peeled before being eaten.

JONES (C. R.). **The Coconut Leaf-miner Beetle** (*Promecotheca cumingii*, **Baly**).—*Philippine Agric. Review*, vi, May 1913, pp. 228-233, 1 pl., 1 fig.

Although the coconut palm is attacked by a comparatively small number of insects the damage done in the Philippines is large compared with insect injury to some other crops. The present pest has already been recorded by the author [*cf.* this Review, A., p. 118], and he now gives a few additional notes on it. The period of incubation varies from 13-15 days, while the larval stage averages about 32 days, of which 28 are spent in feeding. A characteristic habit of the larva is the depositing of its excrement in two rows, one on either side of the excavated chamber. If this chamber be opened the leaf curls and dies, and the larva either dies or its development is greatly retarded. The pupal stage varies from 5-12 days. The beetles are sluggish and do not fly readily when disturbed; they crawl about on the leaves of the young coconut and feed extensively upon the tissues between the veins of the leaflets.

Two species of Hymenoptera of the family CHALCIDIDAE have been bred in great numbers, one from the egg and one from the larva and pupa; these have not yet been identified. The protection afforded by the leaf to the eggs, larvae and pupae prevents the use of any fumigant other than hydrocyanic gas, which could only be used in cases where infestation was very serious. The destruction of infested leaflets and hand-picking of the adults from the leaves is suggested as the simplest remedy.

VINET (E.). **Les Insecticides en Viticulture; notamment contre la Cochylis, L'Eudémis, L'Altise et le Cigarier.** [Insecticides in Viticulture; especially against *Clysia ambiguella*, *Polychrosis botrana*, *Haltica*, and the Cigarette Beetle.]—*Bull. Soc. Agric. France*, 15th May 1913, pp. 357-363.

This paper is a general resumé of the various means now in use for protecting vines from insect attack. The author points out the advantage of using sprays at a relatively high temperature, and says that a temperature of 40°C. at a few inches from the end of the jet does no harm to the vine, while it increases the effect upon the insect. He describes an experiment with an apparatus constructed for the purpose and consisting of a boiler mounted on wheels, in which water containing a certain proportion of a secret composition was vaporised and the spray conducted by a rubber hose amongst the vines. All larvae that were directly touched by the spray were killed.

He cites the details of experiments made in Anjou in 1909 against the Cigarette Beetle and quotes the figures of the results obtained by treatment with a mixture containing copper and arsenate of lead. Had nicotin been used, the expense for material would have been much greater, and it would have been necessary to spray at least twice as often; he thinks that in this case the action of the poison was rather that of an insectifuge than an insecticide. He then goes on to consider *Haltica* and remarks with Dr. Trabut that Bordeaux mixture is an insectifuge for *Haltica*, but that more sprayings are necessary because *Haltica* may produce from four to six generations in the year. It is more or less obvious that the internal poisons will only be of real avail against the larvae, and even then care must be taken to apply them at the correct time; their efficacy will largely depend upon the uniformity of the spraying, and hence the great importance of using sprays of good wetting power.

Internal arsenical and nicotin poisons employed against *Clysia* (*Cochylis*) and *Polychrosis* (*Eudemis*) may act on the perfect insect, the larvae or the eggs. Against the perfect insect they are insectifuges, and their chief effect is to reduce oviposition, this being especially marked when nicotin is used; whereas against the Cigarette Beetle and *Haltica* arsenate of lead is much superior. Bordeaux mixture is said to kill the egg, but nicotin has unquestionably a very definite abortive action. Nicotin employed against the larvae of *Clysia* and *Polychrosis* acts sometimes as a contact and sometimes as a stomach poison; arsenate of lead acts only as a stomach poison and has the advantage of enduring longer than nicotin. The period during which the larva is capable of but feeble resistance is never very long, so that unless the exact moment is taken for spraying, the labour may be in vain. One or two sprays with nicotin, in the author's experiments, destroyed 70 to 80 per cent., and the larvae which survived developed normally and committed the usual amount of destruction; whereas a very similar, but more uniform, result was obtained with arsenate of lead and the larvae which escaped the poison never developed properly.

Cubero (M.). **La desinfección de las plantas por medio del ácido cianhidrico en los establecimientos de Horticultura.** [The disinfection of plants by means of hydrocyanic acid in horticultural establishments.]—*La Ciencia Agricola, Barcelona*, iii, 30th June 1913, pp. 4-5, 2 figs.

The author says that in Valencia, Andalusia and Murcia this method of disinfecting plants has been carried out on a considerable scale by the assistance of the Government and with the most excellent results. He describes the methods adopted for disinfecting orange trees and destroying "pollroig" (*Aspidiotus dictyospermi*) and other pests which he thinks have been very largely introduced from outside. The chamber used was made of brick, lined with Portland cement, 2 metres (6′ 8″) wide, 4½ metres (15′) long and 1½ metres (5′) high with a capacity of something over 22 cubic metres (495 cubic feet).

The plants are first watered and are then introduced into the chamber. The door is closed and also the chimney, and a receptacle is arranged within the chamber in which 140 grms. (5 oz.) of pure sodium cyanide is placed and 240 grms. (8½ oz.) of distilled water to which 160 grms. (5⅔ oz.) of commercial sulphuric acid (66° Baumé) is introduced from the outside by means of a funnel. The operation is allowed to continue for half-an-hour; the shutter in the chimney is then opened and afterwards a small trap in the main door of the chamber, so that a draught is established. In an hour the main door can be opened and the whole place thoroughly aired. A microscopic examination showed that all the Coccids which entered the chamber had been killed.

Mendes (Candido). **Lepidopteros mais damninhos á Agricultura nos arredores de S. Fiel.** [The principal Lepidoptera injurious to Agriculture in the neighbourhood of S. Fiel, Beira Baixa, Portugal.]—*Broteria, Salamanca*, Ser. Zool., xi, 1913, pp. 40-44.

The author gives the following list of Lepidoptera whose larvae damage plants in the neighbourhood of S. Fiel.

*Pieris brassicae*, L., damages cabbages. *Vanessa polychloros*, L., damages cherry trees. Both the larva and pupa of this insect would appear to have many enemies. *Acherontia atropos*, L., occasionally found on olive trees and amongst potatoes; never sufficiently abundant to cause very serious damage. *Phalera bucephala*, L., eats the leaves of whole branches of chestnuts, cork trees and holm-oaks. The attack generally occurs twice in the year. *Thaumetopoea pityocampa*, Schiff., damages pine trees and in September and March is a great pest of *Pinus maritima*. In spite of this attack a great number of the pine trees resist and come into leaf again in the spring. *Lymantria dispar*, L., attacks cork trees and chestnuts. *Acronycta psi*, L., attacks young chestnuts. *Mamestra brassicae*, L.; the larva attacks cabbages at night and especially seedlings just before they are ready for planting out. *Sesamia nonagrioides*, Esp., burrows into the stalks of millet and occasionally into maize. *Zeuzera pyrina*, L., bores the trunks and branches of apples, pears and other fruit trees. *Galleria melonella*, L., the Bee Moth. *Plodia interpunctella*, Hb., damages wheat in the granary and dried figs. *Ephestia calidella*, Gn., damages dried figs. *Pyrausta nubilalis*, Hb., bores the stems of millet. *Cacoecia xylosteana*, L., and *Tortrix viridana*, L.; the larvae of both species roll and eat the leaves of oak. The author thinks that in spite of the great abundance of these caterpillars the actual damage done is not very great. *Polychrosis botrana*, Schiff.; in the neighbourhood of S. Fiel the perfect insect is not common and the vineyard owners do not attribute any special loss to the work of the larva. *Carpocapsa pomonella*, L.; the first generation in June causes the fruit to fall before it is ripe; the second in August and September attacks the fruit and causes it to rot; pears are also greatly damaged by it, and it occasionally attacks

damsons, peaches, plums and oranges. *Carpocapsa splendana*, Hb., attacks the acorns of both the cork and holm-oak. *Carpocapsa splendana*, Hb. var. *reaumurana*, Hb., attacks chestnuts, but more frequently the wild "reboleira" than the "longal" or grafted chestnuts. *Simaethis remorana*, Hb., lives in webs in the leaves of the fig tree. *Prays oleellus*, F.; the larva attacks olive trees; there are three generations, the first of which lives on the leaves, the second on the flowers and the third on the fruit. *Phthorimaea solanella*, Rag., attacks potatoes.

Jones (C. R.). **Insect Notes from the Philippines.**—*Philippine Agric. Review*, vi, May 1913, pp. 246-250.

During February last "Caballero" trees (*Delouix regia*) in various parts of the city of Manila were severely attacked by several species of bag-worms; some of the defoliated trees contained hundreds of these suspended insects at a time, each in a protective case of leaves.

It has been noticed that a species of Red Ant (*Solenopsis geminata*) is very injurious to okra (*Hibiscus esculentus*), attacking the young fruit-buds just before and after blooming or completely destroying the calix and corolla; in some cases considerable damage was done to the seed-pods. The seeking out of the nests and drenching them with petroleum is suggested as an effective remedy.

*Prodenia litura*, F., has been found damaging tobacco and is at all times a serious pest, but easily controlled by a light application of Paris green or arsenate of lead. Another effective means of controlling this insect is hand-picking shortly after the larvae have hatched. The eggs are laid in clusters of from 300-500 each and the larvae remain close together for 3-5 days.

As an example of natural insect control the author cites the case of a Pierid which completely defoliated the trees of *Cassia siamea*, Lam. The eggs which were deposited very freely on these trees were taken to be bred out in the laboratory and preparations were made to spray the trees as soon as the eggs hatched. The collected eggs hatched, but those left on the trees did not and on examination were found to be parasitised by a small Hymenopteron.

The coconut weevil (*Rhynchophorus ferrugineus*, Oliv.) in certain districts has done so much damage as to attract attention. At Ambalang, Oriental Negros, the planters are extracting these weevils from the coconut and burí palms and it is reported that one man has killed as many as eight hundred of these insects in a single day; between the middle of January and 4th February over 52,000 of them were destroyed by the coconut growers in this section, the greater number being taken from burí palms. There are four localities in the Philippines where this insect causes considerable damage, namely: Oriental Negros, Zamboanga, Laguna and Tayabas. The following insects have been taken from the seed-heads of lettuce at Singalong:—

Pentatomidae: *Nezara viridula*, L., *Eurydema pulchrum*, Westw.; Pyrrhocoridae: *Dysdercus cingulatus*, F., *D. poecilus*, H.S.; Chrysomelidae: *Aulacophora coffeae*, Hornst.

Lelli (A.). **Il Tingide del Pero.** [The Pear Tingid.]—*Rivista di Agricoltura, Parma*, xix, 27th June 1913, pp. 403-404.

The author says that this insect does a large amount of damage to pears, especially to those cultivated "en espalier" and in warm positions. Both nymphs and adults puncture the underside of the leaf, often in enormous numbers, producing small galls and causing the leaves to fall. The best remedy, but one which can only be applied to valuable trees, is fumigation with tobacco. Some growers have found that painting the trunks of the tree in autumn with milk of lime, or with milk of lime mixed with sulphate of copper, or with a thick mixture of milk of lime and wood ashes, well rubbed into the bark, gives good results. The author recommends tobacco spray, 1 to 1·2 per cent. with soapy water, as a real remedy. The spray should be in the form of a fan and should be directed from below upwards, great care being taken to wet the underside of the leaves thoroughly. He also recommends that the insects should be carefully collected on a cloth spread on the ground under the trees. Spraying with pyrethrum is also effective, but much too costly. He warns growers that one spraying is rarely sufficient.

Balland (A.). **Les essais d'acclimatation de la cochenille en France.** [The attempts to acclimatise the cochineal insect in France.]—*Rev. Scientifique, Paris*, li, no. 26, 28th June 1913, pp. 801-804.

An interesting account of the history of cochineal culture from the importation of the insect into Europe from Mexico by the Spaniards in 1523, until the decay of the industry in France and Algeria upon the advent of chemical dyes.

Sicard (H.). **Un nuevo parásito del "pyralis pilleriana."** [A new parasite of *Sparganothis pilleriana*.]—*Revista del Instituto Agric. Catalán de San Isidro*, lxii, 5th June 1913, p. 175.

This parasite (*Parerynnia vibrissata*, Rond.) is reported to have destroyed, in the current year, in the neighbourhood of Montpellier, 60 per cent. of the pupae of this Pyralid. The whole larval and pupal stage is passed within the body of the host. The perfect insect begins to appear early in July and no more are seen at the end of the month. Sicard has not yet been able to observe accurately the manner of oviposition, nor is he able to explain how it is that the young larvae may still be found in the body of the host 11 months afterwards. The action of the parasite is somewhat restricted by a *Pteromalus* and by *Chalcis diminuta*, L., which is also regarded as a parasite of the Pyralid.

Le Mout (—). **Destrucción de insectos.** [Destruction of insect pests].—*Rivista del Instituto Agricola Catálan de San Isidro*, lxii, 20th June 1913, p. 191.

The author has for some time been experimenting on the destruction of insect pests by means of vegetable parasites,

making use of artificial cultures of *Sporotrichum globuliferum* against *Pentatoma ornatum*, and with success. He has further continued his experiments against other Rhynchota attacking vines and fruit trees, such as the woolly aphis and *Phylloxera*, by burying prepared cultivations of *Sporotrichum globuliferum* and of *Botrytis bascana* at the foot of the attacked trees; he found that in the following spring they were free from these pests, whilst the controls were still covered with them. Experiments with *Isaria densa* in the same direction have given good results, and he has been able to discover in the bodies of the pests which were probably killed in July 1912, material for fresh cultures, proving that the fungus had caused their death. The author is now experimenting against *Phylloxera* by the same method.

Townsend (C. H. T.). **Preliminary Report on the Picudo of Cotton in Peru.**—*Jl. Economic Entomology*, vi, no. 3, June 1913, pp. 303-312.

The Peruvian cotton-square weevil, *Anthonomus vestitus*, Boh., now commonly known in Peru as the 'picudo del hielo,' is a native of South America. It was found by the author in September 1910 at Cumbibira in the Piura valley, where it is a cotton pest, breeding and feeding in the buds of the squares. The same year it was found infesting cotton throughout the Piura and Chira valleys. In 1911 it was recorded from the Guayaquil district (Ecuador), and also far to the south, in the Chancay valley. During 1912 it was found abundantly in the Casma valley, in some numbers at Lima, a few specimens in the Rimac valley at about 3,000 feet, and in numbers at Tambo de Mora. The remarkably complex character of the more or less arid coast to foothill climate of Peru, which exhibits numerous gradations of aridity and humidity, makes a knowledge of humidity and temperature ranges of the weevil and its enemies very important, and a comparative study of the weevils will indicate those districts where cotton may be cultivated with little injury.

In Piura the following parasites have been found infesting the the 'picudo':—*Triaspis vestiticida*, *Microbracon vestiticida*, *Cerambycobius townsendi*, *C. peruvianus*, *Catolaccus townsendi*, *Eurytoma piurae*.

The small black ant, *Solenopsis geminata*, which in Texas is known as a very effective enemy of the boll-weevil, exists in the western foothills of the Andes, and it is almost certain that it would destroy the early stages of the picudo as effectively as it does those of the boll-weevils, and therefore the ant should be established in the cotton districts of the Peruvian coast region. A closely allied species, *S. pylades*, known in Peru as 'hormiga picador,' is common in the Piura cotton fields, but it has not as yet been observed to prey on the weevil. The ant, *Ectatomma tuberculatum*, which in Guatemala attacks the adult boll-weevils feeding and ovipositing in the green squares, also occurs in the

eastern foothills of the Andes from Guatemala south through Costa Rica and the Andean Montanya to the valley of the Rio Beni in Bolivia.

Carefully planned series of experiments are needed to demonstrate the details of cultural control measures against the picudo to be adapted to the varying conditions existing in the cotton districts of the coast region. As this cotton pest causes an annual loss to Peru of about £400,000, and as moreover the weevil is capable of keeping alive without light or food for more than a month, the necessity for control measures, carried out in a systematic and thorough way, is self-evident.

Portchinsky (I. A.). ЛИСТОѢДКА-ОБМАНЩИЦА И ЗНАЧЕНІЕ ЕЯ ПРИ ИСКУССТВЕННОМЪ РАЗМНОЖЕНІИ ЯЙЦЕѢДА ПЛОДОЖОРКИ ВЪ ТЕЧЕНІЕ ЗИМНЯГО ВРЕМЕНИ [*Phalera bucephala*, L., and its importance for the artificial breeding of *Pentarthron* (*Oophthora*) *semblidis* in winter].—ТРУДЫ БЮРО ПО ЭНТОМОЛОГІИ Ученаго Комитета Главнаго Управленія Землеустройства и Земледѣлія [Memoirs of the Bureau of Entomology of the Scientific Committee of the Central Board of Land Administration and Agriculture], x, no. 4, 16 pp., 8 figs. St. Petersburg, 1913.

V. P. Pospelow in his paper "An experiment on the artificial infection of *Agrotis segetum* by its parasites" in the "Journal of the Sugar Industry" (*Vestnik Sacharnoi Promischlennosti*, 1913) describes a method of breeding the Chalcid parasite *Pentarthron* (*Oophthora*) *semblidis* during the winter. As it does not breed naturally at this season, it is necessary to maintain a constant supply of eggs of suitable insects for this purpose: Pospelow succeeded in obtaining winter imagos of *Euxoa* (*Agrotis*) *segetum* which he fed on sugar syrup, and these started ovipositing on 8th January 1913 and continued to 23rd January. The caterpillars were fed by him on young sprouts of wheat, and from the fourth stage of their life on thin slices of potato. Pospelow concludes that by placing the hibernating caterpillars of *E. segetum* under warm conditions, it is possible to obtain a constant supply of the eggs of this insect for breeding the *Pentarthron*, which develops very quickly.

Dr. Portchinsky suggests that the process may be shortened by using, in place of the caterpillars, the pupae of insects wintering in the pupal stage, a suitable insect for this purpose being *Phalera bucephala*, L., or another species of the same genus *Phalera bucephaloides*, O. It has already been shown by the experiments of I. V. Vassiljew that the eggs of the former insect are freely attacked by the above parasite. This moth is widely distributed in Russia, multiplying in such large numbers that in some parts it is regarded as a forest pest. The pupae are very hardy and the author does not remember a case of failure to obtain perfect insects from these pupae, without any specially

careful treatment; the caterpillars are also equally hardy. For conducting these experiments in Russia the author recommends that in the first instance the pupae should be imported from abroad; in Germany they are offered during the autumn and winter at 1 mark per dozen, and afterwards, should the experiments prove satisfactory, a regular supply could be organised from the Russian forests through the forest officials. In the Government of St. Petersburg this moth is common, the larvae feeding on oak, birch, willow, lime, etc.

THEOBALD (F. V.). **Report on Economic Zoology, for the Year ending 30th September 1912.** — *South-Eastern Agricultural College, Wye,* 110 pp., 36 figs. Price 2*s.* 6*d.*

This report contains an account of the numerous enquiries with reference to noxious insects which were received at Wye during the year specified, together with the recommendations for dealing with them which were sent out in reply. It therefore furnishes a very useful summary of British pests. Various original papers on injurious insects by Mr. Theobald are also reproduced, several of which have already been noticed in this Review (Series A, pp. 33, 77, 91 and 236).

BODKIN (G. E.). **The Rice Caterpillar,** *Laphygma frugiperda,* **S. & A.; a Rice Pest in British Guiana.**—*Jl. Board of Agric., Br. Guiana, Demerara,* vi, no. 4, April 1913, pp. 172-183.

The name " fall army worm " used for *Laphygma frugiperda* in U.S.A., is hardly applicable to the insect in a continuous tropical climate like that of British Guiana, and it has been decided to call it the rice caterpillar, especially as its attacks in that country are confined to rice or grasses. The infestation by this pest was abnormally severe during 1912, both in British Guiana and in the United States. The rice caterpillar generally occurs in countless numbers at the most critical stage of growth in the young rice plants. The young larvae feed on the epidermal tissues of the leaves, producing yellow patches which eventually turn grey and wither. Later, they consume the whole leaf, or they bite through the leaf at its base causing it to fall off. A useful résumé of the life-history is followed by a discussion of parasitic and other methods of control. In British Guiana the best and simplest method of dealing with the pest is to construct the nursery beds so as to allow of complete flooding at any time to the height of the young plants. By this means the larvae are floated on the surface of the water and may there easily be collected and destroyed. Hand-picking the caterpillars, though tedious, is effective and is easily performed by children. Small perches for birds may be erected about the

nursery, and have in a number of cases proved to be of the greatest benefit. If the pest has been allowed to pupate, the dams about the rice nursery should be beaten and well plastered down with mud, so as to prevent the emergence of the moths from the pupae, which are to be found in the soil in this position.

Bodkin (G. E.). **The Egg Parasite of the Small Sugar-Cane Borer.** —*Jl. Board of Agric., Br. Guiana, Demerara*, vi, no. 4, April 1913, pp. 188-198, 4 diagrams.

Of the several parasites known to attack the small sugar-cane borer (*Diatraea saccharalis*) and allied species in British Guiana, by far the most effective is a species of *Trichogramma* closely allied to, or identical with, *T. pretiosa*, Riley. Its first appearance in the Colony is not recorded, though the borer is known to have been present in the cane-fields for the last thirty years. At present the Chalcid is distributed everywhere where its host is to be found, *i.e.*, over all the cane-growing areas. Parasitised eggs of *Diatraea* have been observed on razor grass and on rice, which plants the borer also attacks. The characteristic blackened appearance of parasitised egg-masses renders them conspicuous in comparison with unparasitised ones, and owing to this fact the percentage of parasitism is apt to be overestimated.

Experiments on the life-history and habits of the parasite were made by the author, assisted by Mr. L. D. Cleare, jr., in the biological laboratory of the Department of Science and Agriculture. Parasitised egg-masses were collected in the field, brought into the laboratory and placed in small glass tubes the ends of which were then plugged with cotton wool. The emergence, copulation, etc. of the parasites could thus readily be observed. The maximum number of parasites capable of developing in one *Diatraea* egg is five; the normal appears to be three. Some of the *Trichogramma* oviposit more systematically and effectively than others, a fact which is illustrated in the diagrams accompanying the paper. The average proportion of females to males appears to be 10 to 1. In the laboratory copulation takes place immediately after emergence and the females seldom, if ever, escape fertilisation; the author is further able to confirm the observations made in the U.S.A. that the female *Trichogramma* is capable of producing a parthenogenetic generation, the progeny invariably being male. Shortly after emergence and fertilisation the female begins to oviposit, parasitism of the eggs being only successful within seven days after their deposition by the female cane-borer. The maximum observed number of parasites produced by a single female is 80 survivors of 100 ovipositions. Under laboratory conditions *Trichogramma* (fed with syrup) has been kept alive for five days, the usual length of life being from two to three days. The author deprecates the burning of the trash in canefields as resulting in the destruction of these beneficial insects. The collection of *Diatraea* eggs by children and the rearing of parasites in the laboratory is described. No hyperparasites have as yet been met with.

Stefani Perez (T. de). **L'*Icerya purchasi*, Mask., negli agrumeti di Bagheria.** [*Icerya purchasi* in the citrus groves of Bagheria.]—*Boll. del R. Orto Botanico e Giardino Coloniale di Palermo*, Jan.-Sept. 1912, xi, nos. 1, 2, 3, 1913, pp. 81-82.

*Icerya purchasi* was introduced into Sicily, probably from Naples and Messina, and seems to be gaining fresh ground daily. In the Bagheria district this pest has been responsible for the dying off of several mandarin trees and many young lime trees have been also attacked. The problem is becoming so serious that the Sicilian fruit-growers are advised to introduce *Novius cardinalis* to check the pest.

French (C.). **Report on Furniture Beetle as Affecting Tasmanian Timber.** Presented to both Houses of the Tasmanian Parliament, 20th May 1913.

At the request of the Tasmanian Government the author (Victorian Government Entomologist) visited Tasmania in April 1913 for the purpose of investigating the statements made that Tasmanian hardwood and other timbers are attacked by the furniture or powder post borers (*Lyctus brunneus*). An inspection of different timber-yards, many public and private buildings constructed of Tasmanian hardwood, saw-mills and forests, revealed the fact that the borer trouble existed only in two or three timber-yards, and there only to a small degree. The trouble was caused by one or two careless timber merchants sending infested timber to Melbourne, otherwise Tasmanian timber can be recommended with the utmost confidence.

All saw-millers should be compelled to cut the timber on the quarter, as this would do away with the sap-wood and prevent the attacks of borers to a large extent, as they rarely attack the solid wood. In the interests of the Tasmanian timber industry the borer (*Lyctus brunneus*) should be proclaimed under the Tasmanian 'Vegetation Diseases Act, 1898.' Persons found shipping or having borer-infested timber in their possession should be compelled to destroy it. The appointment of an inspector is also recommended.

Kershaw (J. C.). **Froghoppers.**—*Dept. Agric., Trinidad*, Special Circular no. 7, 20th June 1913.

The author has failed to breed the vermilion Trichogrammid egg-parasite of the froghopper in breeding-cages during the dry season, so that it became necessary to fall back on artificial means of controlling the pest. Apart from the green muscardine fungus, there are three methods which promise success and are being tried on a large scale at Chaguanas:—(1) The application of Nitrolim to the roots of the canes by means of the usual dusters; (2) kerosene-lysol emulsion (3 oz. lysol, 9 oz. kerosene, 4 gals. soft water) applied, when the canes are small, against the adult froghopper, from a whisky bottle fitted with a cork through which passes a short piece of glass tube ($\frac{1}{4}$ inch bore) so that it emits a jet, not a spray; (3) the instant removal of the trash to cattle-sheds should froghopper eggs be found on the old leaves of growing canes.

Keilin (D.) & Picado (C.). **Evolution et formes larvaires du *Diachasma crawfordi*, sp. n., Braconide parasite d'une mouche des fruits.** [Development and larval forms of *Diachasma crawfordi*, sp. n., a Braconid parasite of a fruit fly.]—*Bull. Sci. de la France et de la Belgique*, (7) xlvii, no. 2, 24th June 1913, pp. 203-214, 1 pl.

In the course of their investigations on *Anastrepha striata*, Schiner, which attacks Central American fruits, especially guava (*Psidium*) in Costa Rica, the authors discovered that this fruit fly was parasitised by a hitherto undescribed Braconid, *Diachasma crawfordi*. It is probable that the latter species is allied to the *Diachasma* found by Crawford to parasitise the Mexican Orange Maggot, *Anastrepha* (*Trypeta*) *ludens*, Loew. Prof. Bezzi informed the authors that he had received pupae of *Anastrepha fraterculus* from Brazil which were parasitised by *Biosteres brasiliensis*, Sz., and *B. areolatus*, Sz. The possession by *D. crawfordi* of a long ovipositor indicates that this Braconid parasitises the larvae of the fruit fly when they are partly hidden in the fruit. It is supposed that the parasite deposits its eggs when the fruit (*Psidium*) has fallen to the ground, and is split or cracked, so as partially to expose the host maggots. The pericarp of *Psidium* is too thick for the parasite to pierce with its ovipositor.

Zacher (Dr. F.). *Icerya purchasi*, **Mask., eine Gefahr für die Südfruchtkulturen in Deutsch-Südwestafrika.** [*Icerya purchasi*, a danger to the cultivation of southern fruits in German S.W. Africa.]—*Der Tropenpflanzer*, xvii, no. 6, June 1913, pp. 305-315, 3 figs.

The author regrets the neglect of economic entomology in German S.W. Africa in contrast with the provision of a State institute for applied zoology in Amani (German E. Africa), particularly because within a few years the former colony promises to become a fruit-growing country, which also means that insect pests will have to be contended with. The Imperial Biological Institute for Agriculture and Forestry in Berlin recently received from Warmbad (S.W. Africa) a citrus twig infested with the scale, *Icerya purchasi*. The bulk of the paper is a résumé of the well-known methods of control employed in America and elsewhere, and the author advocates the introduction of *Novius cardinalis*.

Felt (E. P.). **Gouty Pine Midge, *Itonida inopsis*, O.S.**—*Jl. Econ. Entom.*, Concord, N.H., vi, no. 3, June 1913, p. 331.

Last year's observations (Jl. Econ. Entom. v, p. 368) and those of the present season show that under certain conditions this species may be of some economic importance, even though its host plant, the scrub pine, *Pinus rigida*, is not one of the most valuable trees. The larvae of this midge were very abundant

at the end of May 1912, midway between Albany and Schenectady, N.Y., and similar conditions prevailed this season at the end of April. The infestation produces an approximate doubling in the diameter of the twig and presumably interferes with the movement of the sap. One small scrub pine had nearly every shoot affected and over 1,000 larvae or cocoons were to be found on this tree, the vitality of which was much reduced, as shown by the short, pale needles. The injury by the preceding brood showed as swollen, scarred, pitchy areas.

Haseman (L.). **Unspotted Tentiform Leaf-Miner of the Apple** (*Ornix geminatella*, **Pack.**).—*Jl. Econ. Entom.*, vi, no. 3, June 1913, pp. 313-316.

For the last three or four years this insect has been gradually increasing in numbers in Missouri, and probably reached a climax during the summer of 1912. In September and October it was almost impossible to find a single full-grown apple leaf which did not have from one to twenty mines. The pest invariably (Missouri) passes the winter in the pupal stage, protected by a rather firm cocoon, which is made somewhere along the edge of a leaf in late autumn. After the first heavy frosts the leaves containing the cocoons and pupae fall to the ground where they remain throughout the winter. In case the leaf-miner requires special attention it can be checked by early spring ploughing, which will destroy the leaves containing the wintering pupae. Spraying has not had the least effect upon the development of the insect, owing to the fact that the caterpillar is never exposed to the poison upon the foliage, except in those cases where it may feed to a slight extent after leaving the old mine. During the summer and autumn various hymenopterous parasites were so numerous that only a very small percentage of each brood of miners (five distinct, but overlapping broods were observed during the past summer) succeeded in maturing. *Ornix geminatella* will probably never prove to be an exceedingly important orchard pest, and there is little evidence of its having injured either the trees or the apple crop in Missouri.

Townsend (C. H. T.). **A Brief Report on the Piojo Blanco of Cotton.**—*Jl. Econ. Entom.*, vi, no. 3, June 1913, pp. 318-327.

The 'piojo blanco' (*Hemichionaspis minor*) has, since 1905, developed into a serious pest of cotton in the Department of Piura, Peru. It evidently entered this district at the port of Paita on shipments of plants from Guayaquil or Tumbes, and was carried by rail to the towns of Sullana and Piura. The scale has been spread in the Chira and Piura valleys by two agencies operating in contrary directions. The south winds have carried it northwards in both valleys, and the waters of the two rivers have carried in generally southwards.

The following parasites and predaceous enemies are now checking the pest in the Piura Department. *Aspidiotiphagus citrinus* oviposits in the active young of the scale; *Prospaltella peruviana* is less evenly distributed than the first parasite; *P. aurantii* is local (Lima and Piura) and uncommon, probably imported from N. America; *Aphelinus fuscipennis* occurs in the Piura valley only; *A. quaylei* as yet recovered in Piura only from *Pseudaonidia* sp., but certainly at work on the piojo blanco; *Signiphora lutea* is common; *S. occidentalis* not found in Piura till after the 1910 liberations from Lima and 1911 from Barbados; *Neosignophora nigra* is only found in the Piura valley, and not in Lima; *Arrhenophagus* sp. probably *chionaspidis*, not found till after Japanese and Barbados liberations of 1911. A very small black Coccinellid, *Microweisia*, or an allied genus, is very abundant. Two pale yellow Coccinellids, *Psyllobora* sp. and *Exochomus* sp., are locally numerous in the Piura and Chira valleys; also the mite *Hemisarcoptes malus*, species of *Gamasidae* and *Sporotrichum* sp., probably *minimum*. In calculating the spread of these enemies a wide allowance must always be made for fluctuations due to factors beyond control such as variations in climatic conditions and in the activity of the host plant due to irregularity of water-supply. Of the 15 enemies enumerated as now at work on the piojo blanco in Piura, probably the most effective at present is the *Microweisia*, next in effectiveness being *Aspidiotiphagus* and *Arrhenophagus*. The importation, liberation and distribution of the predaceous enemies and parasites is discussed at some length, as well as the artificial breeding of Coccinellids in the insectary. If the breeding of native Coccinellids does not give the desired result, the Japanese *Chilocorus similis* and Florida coccidivorous fungi should be tried in the cotton fields during the wet season, carrying them both artificially through the ensuing dry season in the insectary and putting them out again in the field at the beginning of the following wet season. If the Japanese species cannot be treated in this way, Coccinellids must certainly exist in Lower California and Western Australia that can be so handled.

Three important cultural measures are indicated as a result of the investigations so far made at Piura. (1) All infested plants other than cotton, such as castor bean, pigeon pea, beans, melon, willow, weeds, etc., should be cut out and burned during November and December. (2) Especially during the dry season, plenty of water, as much as the cotton plants can stand without interfering with the proper ripening of the bolls and the crop, should be applied; this stimulates the growth of the cotton plant so that it becomes more resistant to the attack of the scale, and at the same time supplies the degree of atmospheric humidity in the fields necessary to maintain the parasites and enemies in active and effective condition. (3) According to the variety of cotton adapted to the conditions of a particular district, the cotton plants should be cut back and burned after the gathering of the crop, once a year, every two years or, in the case of the native tree cotton (or pais variety), not oftener than once in three

years. Field station experiments are necessary to determine the most advantageous operative details.

The author calculates that the piojo blanco, if left to itself, will diminish the value of the Piura crop by at least 40 per cent. Its normal possibilities for annual damage in Piura are approximately £200,000. The Peruvian Government is urged to institute a rigid quarantine service at all the ports south of Sechura against all the ports from Sechura to Panama, both inclusive, so far as plant importations are concerned, because the piojo blanco exists in practically the whole west coast region and infests a very great variety of plants.

Cardin (P.). **A Probable Parasite of** *Scapteriscus didactylus* **in Cuba.**—*Jl. Econ. Entom.*, vi, no. 3, June 1913, pp. 330-331.

The author discovered that the mole-cricket, *Scapteriscus didactylus*, Latr., known under the name of 'la changa' in Porto Rico as a pest of tobacco, also occurs in the tobacco section of Pinar del Rio Province, Cuba, where it is called 'berraquito de la tierra.' That *S. didactylus* has not become a serious pest in Cuba is due to the common red ant *Pheidole megalocephala*, F., and the fire ant *Solenopsis geminata*, F. At the bottom of one of the burrows of *Scapteriscus* were found the cocoons and a full-grown larva of a parasite, probably a *Myzinida*.

Vosler (E. J.). **A New Fruit and Truck Crop Pest** (*Irbisia brachycerus*, **Uhler**).—*Monthly Bulletin, State Com. of Hort., Sacramento, California*, ii, June 1913, pp. 551-556.

This Capsid is reported as doing serious damage to peaches in Solano Co., California, by puncturing the fruit. It is also recorded from another locality as doing great injury to garden crops. The author found that the insect was not only common on garden crops but on weeds in uncultivated areas several miles from the gardens affected, even wild cucumber suffering. Radishes and rhubarb were particularly affected, though lettuce and onions were also attacked. Hundreds of the insects could be found on the underside of the leaves of rhubarb, and the radishes were almost entirely killed. Roses in the neighbouring garden have been greatly damaged by having the tips of the petals blackened and dried. No eggs or larvae could be found and the author was of opinion that the insects had either migrated from natural food-plants which had dried up, or that it was too early in the season for egg-production to take place. Two weeks later the infested gardens were revisited and the crops were found to be entirely free from the pest. In these circumstances it is a little difficult to suggest a remedy. The insect is found all over California, Colorado, Washington, Idaho, New Mexico and in the Wasatch Mountains of Utah. O. Heidemann has redescribed the insect as *Capsus solani*.

In the same bulletin R. S. Vaile reports on *Pseudococcus bakeri*, Essig, the walnut mealy bug, so called from its habit of feeding

on walnut trees in Ventura County. He has now discovered that it will also live on apples, pears, oranges, lemons, pomelo, elder, cottonwood, southern California black walnut, nightshade and a few ornamental shrubs. In one or two localities it has been found infesting citrus. For a portion of the year it lives primarily on native elder and nightshade, and solanum bushes growing under orange trees have been found with the roots thickly covered with all stages, from eggs to mature adults. The life-history is very similar to that of *Pseudococcus citri*, but the egg-masses are much looser and the number laid by each female is much less. The author thinks that this scale can hardly be regarded as a serious pest and that it will be effectually kept in check by sprays in use against other insects.

A. J. Cook reports that the Corn Worm (*Chloridea obsoleta*, F.) is a serious pest in all parts of California. From the point of view of the tomato-grower its partiality for sweet corn provides a remedy. He suggests that every tenth row in a tomato field should be planted with corn. The insects are attracted to the latter and the tomatos escape. The corn can then be sprayed and the insects killed.

J. D. Neüls reports on testing the use of commercial lime-sulphur with and without the addition of flour paste against the citrus red spider (*Tetranychus mytilaspidis*), and he says that the spotting of the leaves and fruit, familiar to those who use lime-sulphur, was not to be found on those trees where flour paste had been added. Pumps and spraying machines worked much more easily if a little flour was added to the mixture passing through them: a much more even distribution of the spray is obtained and there is no necessity for washing the fruit.

Newell (W.) & Barber (T. C.). **The Argentine Ant.**—*U.S. Dept. Agric. Bureau of Entomology*, Bulletin no. 122, 26th June 1913, 98 pp., 12 pls., 13 figs.

In this bulletin the life-history of the Argentine Ant is given at length. It does not appear to have been regarded as a pest in its native country, but the authors cite references which show that it is a serious pest in certain parts of Brazil; its presence in Lisbon and Oporto was recorded in 1907 by N. Martins; Lounsbury recorded it at Capetown in 1908 and Reed at Concepcion, Chile, in July 1910. Details are given of its invasion of New Orleans and the neighbourhood more than 20 years ago, and there seems to be every reason for supposing that it was introduced into the city by means of the coffee ships from Brazilian ports. The senior author noticed colonies of this ant in the woodwork of the steamer which carried him from New Orleans to New York in July 1911 and another species, *Prenolepis longicornis*, was found in great numbers on board a fruit steamer from Guatemala in January 1912.

The distribution of the ant in California is discussed in detail, with a map, and also its general distribution in the United

States, 14 of which are more or less infested, the largest unbroken area being around New Orleans, with one or two isolated counties in the neighbouring states. The authors say that the distribution has a clear connection with the railroads, and that the only places remote from railroads where the pest has been discovered are on the banks of the Mississippi River below infested localities; they account for this by supposing that the ants have been carried on driftwood which has stranded and so established new foci. The distribution apparently is not affected by extreme variations in annual rainfall nor of mean surface temperature.

The Argentine ants at the present time have attracted most attention as a household pest, invading houses in wet weather and requiring the most strenuous efforts to keep them from food of all kinds. They chiefly attack sweet articles, but also meat of all kinds and, occasionally, corn meal and wheat flour. In badly infested localities it is often necessary to place the bed-posts on sheets of glass coated with vaseline or some other repellant in order that the occupant may sleep in peace. They are very serious pests in shops dealing in food stuffs of all kinds, and also in nurseries and on ornamental plants, as by protecting the scale-insects and plant lice they cause very serious damage. They also seriously attack orange flowers in the groves, and in market gardens they have a habit of removing certain seeds before they have sprouted, lettuce seed being particularly subject to attack. In the sugar-cane fields, in their search for the excretions of *Pseudococcus calceolariae*, the ants are a great nuisance. They build coverings and shelters for the scales to protect them from storms and enemies and attend to them constantly, with the result that the Mealy Bug thrives to an extent which is impossible where the ants are not present. Luckily the area infested by the Mealy Bug is at present restricted, but this insect threatens to become a more serious pest in the future, owing to the manner in which it destroys the eyes of "seed cane" and thus prevents sprouting. The control of the Mealy Bug therefore resolves itself largely into the question of how to control the ant. In corn fields the aphides are far more numerous and much more generally distributed where the ant is present. The latter also attends plant lice upon cotton, and it has been noticed in certain fields of cotton that the lice were abundant throughout the entire summer and autumn, whereas during these portions of the year they are normally almost absent. The damage done by these ants in the orange groves of southern Louisiana is particularly serious. Fig crops are also greatly damaged, the ripening figs being bored and the interior eaten. Bee-keeping on any considerable scale is invariably abandoned when once the ants become numerous, so greatly do they interfere with the bees. In poultry yards they attack the nests of sitting hens and a broken egg will attract such numbers that the fowls abandon their nests, while young chicks are frequently killed by the incessant worry. Pyrethrum powder is found to be practically useless. The only substance which the authors say will protect sitting hens is "zenoleum" powder. Indirect injury is due to the antagonism between the Argentine ant and certain native species; thus the Fire ant,

*Solenopsis geminata*, which is useful, in that it destroys a considerable number of Boll Weevils, is exterminated and its place taken by the far more troublesome Argentine ant.

Father Biever states that they have in many cases completely exterminated the bed-bugs in the hovels and tenements occupied by poor people in the city of New Orleans.

The authors then proceed to describe the insect at length, full details being given as to the methods of study adopted and a lengthy account of the life-history of the insect in all its stages. The nests may be found almost anywhere, provided that light and water are sufficiently excluded. The ants seldom burrow to any great depth in the ground and when they make burrows these are generally at the foot of tree-trunks or under the ridges in cane, cotton or corn fields, from 4 inches to 10 inches below the surface being the usual depth. These ants have a strong dislike to light; their sense of smell is exceedingly keen, but it is doubtful whether they possess the sense of sight or hearing, at all events to any considerable extent. Foraging ants have been found to travel about 145 feet per hour. The authors discuss the relations of the ant to other insects at length and give a list of scale-insects and aphids attended by the ants, with the trees on which they are found, and they say that these Homoptera are so thoroughly protected that it is very rarely that a ladybird is found at all on the infested tree. In one respect the ant is beneficial, in that it eats the sorghum midge *Contarinia* (*Diplosis*) *sorghicola*, Coq. Observations on the natural control of this ant have shown that a cockroach (*Thyrsocera cincta*, Burm.), which occurs in the southern United States, Mexico and Central America, eats it, but the number of ants destroyed by this insect is certainly inappreciable. Attempts were made to infest a nest with *Pediculoides ventricosus*, Newp., and the authors reared enormous colonies of these mites on larvae and then placed them in the formicaries, but found that although the mite had some effect, nothing approaching the quantity used was ever likely to occur in nature and the method was therefore useless. Attempts to infect colonies with the fungus, *Sporotrichum globuliferum*, yielded no practical results.

The authors then go on to consider artificial methods of control and repression. Various proprietary and coal tar disinfectants were tried and it was found that none of these was effective for more than two days in preventing the travelling of ants. Oil of citronella seemed to be more distasteful and was effective so long as the odour remained, but it required constant renewal. Zenoleum powder was quite effective. Pine tar, tobacco dust and sulphur were found to be of no use whatever. Bands of tanglefoot were only useful until a sufficient number of ants had been captured to form a bridge for the others. Crude petroleum was found to be on the whole the best repellent of all the liquids used. Tape soaked in a solution of corrosive sublimate and allowed to dry and fastened round the legs of tables, edges of shelves, &c., was effective for many months, provided it was kept dry. It is useless as a poison because the ants cannot be persuaded to touch their favourite foods when it is present in the

proportion of 1 to 500. The extremely poisonous nature of the substance renders it difficult of application in households. Fumigation experiments are described and experiments with poisons of various kinds. Two or three protected saucers placed about a room or under tables bearing poisoned honey, meats, &c., would effectually rid the vicinity of ants in from one to three days' time, and it was further observed that they never returned in numbers so long as the dishes of poison were kept there. Methods of keeping the ants from apiaries are described and practically consist in placing the hives upon a table with weather-boarding round the sides to protect the upper part of the legs from wet and fixing round these legs bands of corrosive sublimate tape, and below them plates of sheet zinc about 6 inches square to prevent storm water from splashing upwards. The difficulties of control in orange groves are great, but it has been found that the spread of the pest can be effectively limited by digging ditches through the groves which are kept filled with water and making special provision to prevent the passage of the ants across the necessary bridges for transit purposes. Winter trap boxes were also found to be very satisfactory. These are rough boxes 2 ft. by 2 ft. by 3 ft. filled during the latter part of October with a mixture of cotton seed and dead grass. The top is left open so that the rain would wet the contents and start decay. By cutting down the standing grass and weeds in the orchard the ants appear to be driven into these trap boxes and can then be destroyed. Hydrocyanic acid was useless, but carbon bisulphide was found to be perfectly satisfactory for their destruction. The bulletin concludes with a lengthy bibliography dating from 1868.

Bezzi (Prof. M.). **Indian Trypaneids** [Trypetids] **(Fruit-Flies) in the Collection of the Indian Museum.**—*Mem. Indian Museum*, iii, no. 3, pp. 53-175, 3 pls.

This memoir is practically a monograph of the Indian flies of the family Trypetidae, and keys are given to all the genera and species. Prof. Bezzi has also compiled a list of all the Oriental and Australian species (334) hitherto described, with brief comments upon most of them. The wings of 72 species are figured.

**Report on the Botanic Station, Monserrat, for** 1911-12, pp. 7-16. Barbados, 1913.

The following pests are noted in this report. Corn Ear Worm (*Laphygma frugiperda*). Corn plants, with the exception of attack from this caterpillar, are said not to be very subject to disease. As the caterpillars burrow downwards into the unfolding leaves it is difficult to reach them with poisons. The local remedy is to throw dry earth into the heart of the plant, but careful investigations have shown that this is useless. The only insecticide which has been found to kill the caterpillars is lead arsenate, and this, when applied pure, caused scorching,

which was avoided when the poison was mixed with lime at the the rate of 1lb. arsenate to 4lb. of lime and applied as a spray at the rate of ¼lb. of arsenate to 4 gals. of water; but even this did not reach all the caterpillars.

Bengal Bean Caterpillar (*Thermesia gemmatilis*). Experiments have been made to ascertain whether the Bengal bean can be safely dusted with Paris green and lime with a view to controlling this pest. Paris green mixed with lime at the rate of 1lb. Paris green to 6lb. of lime was found to destroy completely the purple bonavist bean, but in all the trials, 6 in number, made with this mixture upon Bengal beans there was scorching but no defoliation. Lead arsenate used in the same proportions caused no scorching.

Cotton Stainers. Two species are prevalent in the island *Dysdercus andreae* and *D. delauneyi* and both are widely distributed. Early measures of repression are said to be very necessary.

Cotton Flower-bud Maggot (*Contarinia gossypii*). Specimens of this insect were hatched at the Botanic Station and identified as the species attacking cotton in Antigua. It usually appears at the windward side of the island about December, but has been noticed in nearly all parts at different times.

The principal coconut pest is said to be the Bourbon scale (*Aspidiotus destructor*). The chief pest of the sweet potato is *Euscepes (Cryptorrhynchus) batatae*, known under the name of Jacobs, which is occasionally very destructive. At Grove Station it was found that one-third of the plot was badly infested, while the remainder was practically free from the pest.

The Chaff Scale (*Parlatoria pergandei*) was found attacking citrus plants at Grove Station early in 1911. This is the first record and it is probably a recent introduction, as it has not been observed outside the station.

Lime trees are attacked by the green scale, *Coccus viridis*, and the purple scale, *Lepidosaphes beckii*. These appeared at the eastern end of the island early in 1909 and have gradually spread to the western, affecting practically all the trees. This progress has occupied about two years, and the bearing capacity of the trees has been seriously affected; in the year under review the condition of the trees at the western end has declined owing to serious scale attack and three trees have died at the experiment station.

McNaught (Major J. G.). **Temperature reached in Army Biscuits during Baking.**—*Jl. Roy. Army Med. Corps, London*, xxi, no. 1, July 1913, p. 136.

With reference to an article on this subject in the June number of the R.A.M.C. Journal [this *Review*, Ser. A, pp. 292-294] the writer wishes to draw attention to a statement by Decaux ('Les parasites du biscuit de troupes, moyens de préservation,' Arch. de Méd. Milit, 1872, Revue d'Hygiène, 1893, p. 156) referred to in Lemoine's 'Traité d'hygiène militaire' (Paris, 1911).

"Decaux has studied three varieties:—*Ephestia elutella*, *E. interpunctata* and *Asopia farinalis*, and has shown that these insects only frequent the cases of biscuits from the end of May to the beginning of September; hence the indication to pack the biscuits only in the intervening period of the year." If this statement were confirmed, it would apparently be a simple matter to avoid the infection of biscuits by these insects.

Graham-Smith (G. S.), Fantham (H. B.), Porter (Annie), Bullamore (G. W.) & Malden (W.).—**Further Report on the Isle of Wight Bee Disease**, *Microsporidiosis.—Supplement to the Jl. of the Bd. Agric., London*, July 1913, 39 pp.

According to the authors, it may be stated with confidence that a protozoal parasite, *Nosema apis*, is the agent responsible for most of the outbreaks in which the symptoms of the Isle of Wight disease have been noticed, or in which stocks have dwindled or died without apparent cause.

*Symptoms.*—It is pointed out that certain symptoms such as the inability of the diseased bees to fly, the presence of numerous bees on the ground in front of the hives, and the gradual dwindling of stocks, are common; but many other symptoms have been recorded, and no one of them is characteristic of the disease. The only essential feature is the death of large numbers of bees, and often of the whole stock, especially during wet and cold periods of the year or during the winter months. It has been further shown that the disease is probably endemic, but that, owing to lack of observation, it often passes unnoticed in mild seasons, the loss of the bees being attributed to cold, starvation, spring dwindling, robbing, wax moth, diarrhoea, and other causes. It is only during severe epidemics that the disease attracts much notice. These epidemics are especially apt to make their appearance during cycles of wet and cold springs and summers, and may continue subsequently for some seasons.

*Modes of Spread.*—Water or moisture near hives contaminated with infected excrement appears to be the most important factor in the dissemination of the disease; nectar, pollen, or other substances collected as food may on rare occasions be infected. Infection within the hive may occur through infected water stored in the cells, the passage of wax, &c., from bee to bee, and more especially by excrement deposited by infected queens, drones, and worker bees suffering from dysentery. Pollen and honey contaminated by excrement may also cause infection.

Infection from hive to hive and from apiary to apiary is brought about mainly by the interchange of adult infected "carriers," and to a less extent by robbing (especially when the living remnants of the weak stock join the robbers), by infected swarms entering healthy apiaries, and by the occupation of old hives. Infected "carriers" are probably most important agents in spreading the disease by infecting water or food with their faeces, as well as in keeping it in existence from season to season.

The trade in bees from infected districts helps to disseminate the disease over greater areas than would be reached by natural means. Cold and wet weather, by affecting the health of stocks and affording opportunities for bees to gather contaminated moisture near hives, greatly influences the spread of the disease. Other insects associated with hives of bees, such as wax-moths, wasps, and ants, and other species of bees, may at times carry the spores of the disease, and thus play some part in their dissemination.

*Treatment and Prevention.*—There is little evidence that treatment by any of the remedies which have been suggested results in permanent cure, though amelioration of the symptoms for a time not infrequently occurs. Prevention is therefore the only satisfactory method of controlling the disease. Healthy stocks should be removed from the neighbourhood of diseased ones, and the bees should be supplied with an easily accessible supply of clean water which should be changed daily, and protected from contamination by flying bees. If necessary, the usual drinking places should be removed. Bees killed by the disease, frames, quilts, &c., from infected hives, should be burnt, and the hives should be disinfected, preferably by slight charring. The ground about the hives should be turned over and treated with lime. Diseased stocks should be destroyed as soon as the condition is diagnosed, and further, healthy bees should not be introduced into an apiary where the disease has shown itself. Driven bees and stocks from infected districts should not be imported into other districts. Finally, an endeavour should be made to build up apiaries from stocks which have escaped infection.

**Die Rebenblüten-Gallmücke** (*Contarinia viticola*, **Rübsaamen**). [The vine-flower gall-midge, *Contarinia viticola*, Rübs.]—*Luxemburger Weinzeitung*, i, no. 21, 1st July 1913, pp. 357-358.

In the course of an inspection of the vineyards at Schwebsingen (Luxemburg) practically every inflorescence showed a few buds which were conspicuous by being larger and of a paler, more yellowish colour than the others. These buds, when opened, were found to contain from two to six yellowish white and shiny 'worms' which caused the gradual dying-off of the infested buds, and proved to be the larvae of *Contarinia viticola*. The eggs are deposited by this tiny gall-midge in spring, when it may be observed to insert its ovipositor between the sepals of the vine-bud. The young larvae suck the juices from the ovary and stamens, at first accelerating the growth of the flower, but later causing it to dry up. The fully-grown larvae drop to the ground, where they pupate in early spring, the midges appearing as soon as the vine begins to show flower-buds. This year (1913) the gall-midge is occurring in large numbers and the damage is estimated at one-tenth of the crop. The appearance does not seem to be quite so disastrous in vineyards treated with nicotin sprays, but experiments regarding the control of *Contarinia* have not yet been made.

Fixmer (F.). **Zur Bekämpfung des Heu- und Sauerwurms im Luxemburger Weinbaugebiet.** [The control of the vine moth in the Luxemburg vine-growing district.]—*Luxemburger Weinzeitung*, i, no. 21, 1st July 1913, pp. 351-355, 1 col. plate.

*Clysia ambiguella* is by far the most formidable of vineyard pests in Luxemburg and the most difficult to control. Of all the sprays experimented with, nicotin has proved to be the most satisfactory, partly because it asphyxiates the moths on the wing and partly on account of its value as a stomach poison. As nicotin is volatile and rapidly loses its poisoning power it is essential to spray before the caterpillars have entered the blossoms or grape-berries. The best results have been obtained when the spray was applied at the time when the moths are most numerous, which practically always coincides with the first appearance of the caterpillars. As the date varies in different localities, vine-growers have to use their own discretion rather than act according to fixed rules. It is advisable to hang up vessels containing cider or fermenting wine as traps for the moths and as indicators of the right moment for spraying. A spray containing 1·33 kilograms of nicotin in 100 litres of Bordeaux mixture, or if greater wetting power is desirable, 1·5 per cent. nicotin and 1·5 per cent. soft soap, may reduce the ravages of the pest to a negligible quantity. A coloured plate illustrates the different stages in the life-history of the vine moth, and the damage to vine-blossoms and grapes.

Theobald (F. V.). **The British Species of the Genus *Macrosiphum*, Passerini. Pt. 1.**—*Jl. Econ. Biol.*, viii, no. 2, 1st July 1913, pp. 47-94, 30 figs.

So far fifty-five species, of which twelve are new, of the Aphid genus *Macrosiphum* are recorded for Britain. The list of British species is followed by a list of host plants with the species which affect them, and by a detailed description of 25 of the latter.

Hewitt (T. R.). **Notes on the Occurrence of the Woolly Aphis, *Schizoneura lanigera*, in the Core of Apples.**—*Jl. Econ. Biol.*, viii, no. 2, 1st July 1913, pp. 95-98, 1 fig.

On 20th January the author received for examination the core of an apple, a 'Newtown Pippin' from California, sold in the Dublin fruit market, and found it to be infected with *Schizoneura lanigera*. Other apples of the same variety were infected by this aphid, and, except for a little mildewy appearance of the eye, they seemed quite healthy. There was a small channel connecting the eye with the core in these apples and through this channel the aphids gained access to the core; this channel, however, is not common in many varieties. The core presented a white, mouldy appearance, due to the woolly secretions of the aphids and to the growth of some fungus, which was probably secondary. In one

apple, which was rather more badly infected than the others, the seeds presented a damaged appearance, but the flesh of the apple was not injured in any instance. Only one or two adults were found in each core, the others being immature forms. There does not seem to be any record of the woolly aphis attacking the core, but its occurrence in this manner is probably more common than is known. It would be not only a convenient method of hibernation, possibly enabling the species to propagate during the winter, but also a means of spreading the pest from one district to another. The author, further, discusses the observations of Patch, Stedman, Marlatt, Theobald and Lohrenz on the hibernation of *Schizoneura*.

COLLINGE (W. E.). **Collembola damaging Pine Trees.**—*Jl. Econ. Biol.*, viii, no. 2, 1st July 1913, p. 99.

A number of shoots of *Pinus sylvestris* submitted to the author showed a falling off of the opening buds. The young needles had a dry, withered appearance in some cases, but still retained their connection with the shoot, whilst in others they immediately fell away on being handled. A dissection of a few partially damaged buds revealed a number of specimens of a Collembolan, *Seira nigromaculata*, Lubbock, and on further investigation every damaged bud was found to contain five or six examples. The insect seems to be attracted by the resinous gum, and, as soon as the leaf-bud opens, makes its way to the bases of the young leaves and commences to bite into them; after a short time the needles turn yellow and ultimately fall away. Sometimes only part of the base is destroyed, and part of the bud remains in a damaged condition, but in most cases the buds are completely ruined. The scattering of naphthalin around the base of the stem or smearing it with some sticky material in the autumn would probably keep the trees free from these insects.

FEYTAUD (Dr. J.). **Les ennemis de l'osier; la grosse Chrysomèle rouge, *Lina (Melasoma) populi*, Linn.** [The enemies of the Osier; the large red Chrysomelid, *Lina populi*, L.]—*La Revue de Phytopathologie Appliquée*, i, no. 3, 5th July 1913, pp. 37-39.

The author says that CHRYSOMELIDAE are perhaps the commonest pests of the osier. The genera *Lina*, *Phratora*, *Phaedon* and *Plagiodera* seem to be more or less restricted to willows, poplars, aspen, alder and birch; *Lina populi* passes the winter in the adult stage in various sheltered places, coming out about April, just at the time when the osier begins to put forth its first leaves. The eggs are laid in groups of 10 to 20 on the leaves and hatch in about 10 days, the larvae immediately attacking the parenchyma of the leaf. There are three generations in the year, and damage is done by both the larva and perfect insect, which eat the leaves of poplars and willows, only the large veins

being left. In the Gironde *Salix fragilis* and *S. viminalis* are specially cultivated and the author says that *L. populi* attacks almost exclusively the latter species and is sometimes so abundant that the leaves are completely destroyed as fast as they appear, with a result that the osier grows badly and yields an inferior product. The larva is parasitised by a Tachinid fly, *Exorista dubia*. The author suggests as a remedy, the use of sheltered traps placed here and there in the osier beds to attract the hibernating insects, which may be collected and destroyed in January and February. The beetles can also be easily captured in the spring, but the process is lengthy and expensive, as it requires continual repetition. Insecticides containing nicotin give excellent results, because they not only poison the insects and the larvæ, but also prevent oviposition. In 1908, the author made a definite experiment as follows:—He took a plantation of red osier (*Salix fragilis*) containing plants of the same age (14 years) and divided it into four equal areas of 120 square yards each; one was left untreated as a control; another was sprayed with Burgundy mixture; another with a nicotin formula, but without copper; and the third with Burgundy mixture containing the same proportion of nicotin as no. 2, viz. 1·3 per cent. The three squares were each treated six times and on the same days. Soon after the spraying was commenced obvious differences developed between the four plots. In September the sprayed plots were very much more vigorous than the control, and the best result was obtained on the plot treated with copper mixture and nicotin. The quantities of osier produced were as follows:—no. 1 (control), 80 kilos worth 5 frcs.; no. 2 (copper mixture), 89 kilos worth 7 frcs.; no. 3 (nicotin mixture), 97 kilos worth 9·50 frcs.; no. 4 (copper and nicotin), 141 kilos worth 14·50 frcs. The author adds that a fungus (*Melampsora*) which causes the leaves to fall prematurely was also controlled by the treatment.

Guillaud (E.). **La mouche à scie des rosiers.** [The Rose Saw Fly.]—*La Revue de Phytopathologie Appliquée*, i, no. 3, 5th July 1913, pp. 41-42.

The yellow fly or rose saw-fly (*Hylotoma rosae*, L.) commences to appear in the middle of May. The eggs are generally laid early in the morning at an inch or so from the end of a young branch, in the tender bark of which the female drills a hole, placing an egg in it and covering it with a bitter frothy liquid. The operation is repeated perhaps 15 to 20 times on the same branch. From 10 a.m. to about 5 p.m. the flies are not seen about the rose trees. They go to seek food on other plants and may be caught on beetroots, carrots and especially parsley in flower. The frothy liquid which the insect squirts over the eggs is very corrosive and the plants covered by it become brown and hard, and their development is arrested, causing curvature of the branch. The buds at the ends of these branches cease to grow and very rarely open. The larvae hatch in about 15 days, and after feeding upon the leaves descend into the earth to pupate.

There are two generations, one in May and June and another, far more numerous, in August and September, which hibernates in the pupal stage. The damage done by this insect is very great, but not all varieties of rose trees are attacked to the same degree, tea roses being less subject to attack than other varieties.

The rose *Hylotoma* is parasitised by certain Chalcids, viz. *Pteromalus hylotoma*, *Eulophus incubitor*, *E. hylotomarum* and *E. migrator*. Wasps and insectivorous birds also destroy large numbers, but unfortunately the natural enemies are far from sufficient to keep down the pest.

Amongst the remedies recommended are, the thorough stirring of the earth around the trees, so as to expose the cocoons, and the cutting away of all those branches which show the characteristic arching and the brown scar at the point of curvature; these branches, which contain the eggs of the sawfly should be immediately burnt. The larvae may be destroyed by spraying at the end of May and at the end of August with the following mixture:—Water 1 litre, carbonate of potash 5 grms., soft soap 10 grms., linseed oil 15 grms.; the soda and soap are first dissolved in boiling water and when cold the oil is added slowly with constant stirring. M. Margottin, as a result of his observations on the feeding of the insects, has suggested the planting of curled parsley, the flowers of which are particularly attractive to the saw-flies, which can be easily caught by hand when visiting them.

**La mouche des carottes.** [The Carrot Fly, *Psila rosae*, F.]—*La Revue de Phytopathologie Appliquée*, i, no. 3, 5th July 1913, p. 43.

During the present year this insect has done considerable damage to market gardens in the south of France. The remedy suggested is to spread sand, which has been previously soaked in petroleum or carbolic acid, between the lines of plants. This keeps away the females at the time of oviposition. In autumn the ground should be well stirred and turned over to bring the pupae to the surface. All plants which have turned yellow should be pulled up and given to cattle at once or boiled. It must not be forgotten that celery, parsley, turnips and allied plants are all equally subject to attack.

Schneider-Orelli (O.). **Zur diesjährigen Sauerwurmbekämpfung.** [This year's campaign against the vine moth.]—*Schweiz. Zeits. für Obst- und Weinbau, Frauenfeld*, xxi, no. 13, 8th July 1913, pp. 200-201.

In many vineyards of Eastern Switzerland the infestation by the first generation of the vine moth has been more severe this year than in 1912, so that direct methods of control will have to be resorted to, in order to check the second generation. The use is recommended of traps consisting of wide-mouthed preserve jars containing dilute fruit wine (pear cider) and hung to the vine-stakes at a distance of six to twelve yards apart. Last year on an

average 51 vine moths of the second generation were captured in each jar, while only two moths per jar were trapped when the first generation was on the wing; this year three to four per jar were caught in spring, and of these four-fifths were females.

There is a marked reduction in the occurrence of *Polychrosis botrana*, especially in the vineyards of Lake Zürich, and *Clysia* (*Conchylis*) *ambiguella* preponderates in numbers. Probably the continual rain last year was detrimental to the warmth-loving *Polychrosis*, because in vineyards where this species preponderated last year the balance has been turned in favour of *Clysia*.

Schneider-Orelli (O.). *Epitrimerus piri* **infesting Pear Leaves.** —*Schweiz. Zeits. für Obst- und Weinbau, Frauenfeld*, xxii, no. 13, 8th July 1913, p. 208.

Pear leaves sent to the Swiss Experiment Station at Wädenswil for examination were found to be badly infested with small mites, *Epitrimerus piri*, which cause the leaves to curl. It is probable that this pest hibernates in the buds and already infests the leaves when they begin to sprout. The mites leave them in autumn before they fall, but spraying would not be feasible as it is difficult to determine the proper time. It is advisable to pick and burn infested leaves, as thereby it is possible to control the mite without unduly damaging the tree.

Picard (F.). & Blanc (G. R.). **Les infections à coccobacilles chez les insectes.** [Coccobacillus infections in Insects.]—*C. R. Hebd. Acad. Sci., Paris*, clvii, no. 1, 7th July 1913, pp. 79-81.

Since the authors' first communication on the *Coccobacillus* of *Arctia caja* [*see* this *Review* ser. A. p. 166] they have made further experiments on other insects, and have always obtained positive results with regard to the following species:— Coleoptera: *Poecilus koyi*, *Opatrum sabulosum*, *Cetonia aurata*, *Melolontha vulgaris*, *Anoxia australis*, *Chrysomela sanguinolenta*, *Cleonus mendicus;* Hemiptera: *Eurydema ornata;* Orthoptera: *Periplaneta orientalis*, *Epacromia strepens*, *Acridium aegyptium;* Lepidoptera: caterpillars of *Arctia caja*, *Porthesia chrysorrhoea* and *Bombyx mori*. This list could no doubt be extended indefinitely, since it is probable that the majority of insects are killed by *Coccobacillus cajae*. It is of interest to note that while the virus is fatal to the majority of Coleoptera, aquatic beetles (*Hydrophilus* and *Dytiscus*) are immune. The authors found that a *Bacillus* most probably identical with that recently described by Chatton [*see* this *Review* ser. A. p. 306] as *B. bombycis* is fatal to the beetle *Anoxia australis*. Finally, they discovered in caterpillars of the gipsy moth (*Lymantria dispar*), which are this year exceptionally abundant in Southern France, a fatal septicaemia caused by a *Coccobacillus*, for which the name *C. lymantriae* is proposed. The authors were able to prove without doubt that, in the case

of *Arctia caja* at least, it is possible to kill the insect with a few drops of the *Coccobacillus* culture introduced into the alimentary canal without finding a trace of the virus in the blood. The problem concerning the virulence of the *Coccobacillus*, however, is not yet settled, but it is possible to irritate the digestive tube of the host to such an extent by an injection into the circulatory system that *Arctia caja*, as well as frogs, died with symptoms of violent diarrhoea and prolapsus of the intestine. On the whole, the species, or varieties (races), *B. cajae*, *bombycis*, *melolonthae* and *lymantriae*, differ from *Coccobacillus acridiorum*, d'Hérelle, in that the latter is always fatal to the locust if ingested but innocuous to the silkworm.

J. D. **Nikotin und Conchylin sind wirksame Bekämpfungsmittel des Heuwurms.** [Nicotin and "conchylin" are effective means of controlling the Vine Moth.]—*Luxemburger Weinzeitung*, i, no. 22, 15th July 1913, pp. 369-373.

According to numerous experiments made in Luxemburg under the direction of the Viticultural Commission, sprays containing nicotin or 'conchylin' (a preparation sold by a Berlin firm) are effective against the vine moth (*Clysia ambiguella*) to such an extent that viticulture may again be carried on with a profit. The price of 100 litres of spray consisting of 1·5 kilograms each of nicotin, cotton-oil soap, copper sulphate and lime is 4·91 marks, whereas an equal quantity of spray containing 20 litres of conchylin (at 0·70 marks), 1·5 kilograms each of cotton-oil soap, copper sulphate and lime costs 15·46 marks. The relative efficacy of the two sprays has yet to be tested.

Moreau (L.) & Vinet (E.). **La Cochylis; constatations actuelles; traitements d'été.** [Reports on *Clysia ambiguella* and its summer treatment.]—*Bull. de la Société des Agriculteurs de France*, 15th July 1913, pp. 55-56.

Vineyard owners report with surprise a serious invasion of Cochylis, and especially in the West of France the damage done by the first generation is already serious, causing cultivators much anxiety as to possible damage by the second generation. The authors say that many owners have neglected to treat their vineyards either because they did not believe in the efficacy of insecticides, or because the moths have arrived almost unperceived, and in many cases nothing has been done to discover their presence. They insist upon the necessity of setting up traps in the vineyards as soon as the moths are seen, as guides to the seriousness or otherwise of the invasion and say that in their own experimental vineyard the use of traps enabled them to predict a serious attack by Cochylis, and further that this might have been predicted last autumn. One of the authors in a paper read at a meeting of the Viticultural Section of the Society in February, said "after the harvest very many Angevin vineyard owners noted with some surprise the presence of numerous larvae of Cochylis on their vineyard tackle and about

the press-house, a sure sign that the pest was already present in the vineyards in large numbers" and suggested that they should redouble their vigilance.

The authors recommend that traps should be set up for the second flight of moths, and that the grapes should be sprayed, when the flight of the moths is at its height, with copper washes containing nicotin (133 grms. of the alkaloid to the hectolitre (0·133 per cent.) made slightly alkaline). The difficulties presented by this spray treatment are considerable, and it can only be carried out in those vineyards where the vines are not overgrown, and by proprietors who have a qualified staff at their disposal; if the work cannot be carried out properly it is better to dust the vines with insect powders. They suggest sulphur with nicotin, sulphur with naphthalin (15 per cent. of naphthalin in powder), sulphur with lysol, or sulphur with pyridin, mixtures of sulphur and hydraulic lime, etc.; these dustings to be supplemented by the free use of traps. The authors say that, in 1912, in their experimental vineyard by setting one trap to every five or six vinestocks in every 10 to 15 rows and by directing the dusting in such a manner as to drive the moths towards the traps, they captured 1,500 moths in the summer in 15 traps made out of an ordinary glass containing waste wine with a drop of vinegar. They further say that all that can be hoped for is to reduce the summer generation as much as possible. It cannot be entirely destroyed by any known means and operations against this generation are not to be compared in efficacy with a well organised attack on the spring generation. In their own experimental vineyard in this year they have been able almost completely to destroy Cochylis by operations in spring.

Dalmasso (G.). **L'estratto di tabacco contro le tignole dell'uva.** [Tobacco extract against the Grape Moths.]—*La Rivista di Viticoltura, Enologia ed Agraria, Conegliano*, xix, ser. v, no. 14, 15th July 1913, pp. 330-331.

The author says that insecticides in general do not give regular and uniform results, especially when applied on a large scale, and he regards tobacco extract combined with Bordeaux mixture as the best spraying fluid, although by no means an ideal remedy. He refers to Catoni's experiments and points out that the results obtained are hardly proportionate to their cost. [See this *Review* ser. A, pp. 250-251.]

**Insetti che daneggiano le foglie del pero.** [Insects which damage the leaves of pear trees.]—*Rivista di Agricoltura, Parma*, xix, 18th July 1913, p. 461.

*Luperus rufipes* and *L. flavipes* are reported by a correspondent of the paper as damaging the leaves of his pear trees. He is advised for small or special trees to spray with a 3 per cent. solution of carbolised extract of tobacco and for a large number of trees to use a spray made of 1 kg. of petroleum, 2 kgs. of soft soap and 100 litres of water (1, 2 and 100 parts by weight respectively).

Vidal (Dr.). **Insectes nuisibles aux artichauts.** [Insect pests of artichokes.]—*La Vie Agricole et Rurale*, ii, no. 33, 19th July 1913, p. cclvii.

The author points out the danger which exists in those districts in which this vegetable is cultivated on a large scale of an extraordinary invasion of *Vanessa cardui* and also of a Noctuid, which he believes to be *Xanthoecia flavago*, Schiff. The caterpillars of the former live entirely upon the parenchyma of the leaves on the upper surface. It has been remarked that everywhere where the artichoke leaves have not sufficed for the food of the swarms of larvae they have migrated to cardoons. The swarms make their appearance about the time when the growth of the artichoke plants is complete in the South of France, and the damage consists in stripping the leaves and preventing the maturation of the heads. Spraying and dusting with insecticides appear to be absolutely without effect. Arsenical sprays have not been used and the growers have been driven to cutting off the attacked leaves and burning them. M. Bénard of the Muséum d'Histoire Naturelle has examined a large number of pupae of *Vanessa* collected from artichoke gardens and has discovered that almost everyone is parasitised by a Chalcid.

Unfortunately this is not the case with the second pest abovementioned, which has become exceedingly serious because it attacks, in the late season of growth, the stems which support the artichokes and the artichokes themselves. The period of fruiting of the artichoke coincides with the development of this Noctuid, the larva of which, beginning in the axil of the leaves, bores into the stem and eats out the pith, so finding its way into the interior of the flower. Its attack is occasionally made also either from within or from without upon the capitulum or the bracts. The life-history of this pest has not yet been properly studied, and the author says that the only method at present of dealing with it is to examine the plants carefully and to burn any branches which appear to be attacked.

Richardson (C. H.). **A New Braconid of the Genus *Microdus* from Canada.**—*Canadian Entomologist*, xlv, July 1913, p. 211.

The author describes a new Braconid, *Microdus ocellanae*, bred from the bud moth (*Tmetocera ocellana*, Schiff.) at the Dominion Entomological Laboratory, Bridgetown, Nova Scotia.

McDunnough (J.). **Concerning the Reputed Disastrous Occurrence of *Vanessa californica* in Oregon and California.**—*Canadian Entomologist*, xlv, July 1913, pp. 233-235.

The author is of opinion that the recent outbreaks described by F. M. Webster of the Bureau of Entomology, Washington [see this *Review* ser. A. p. 177], are in all but the last case not due to *Vanessa californica*. He says that it is a well known fact that the larvae of the various species of *Vanessa* are restricted to

one or two food-plants, and that it would be very extraordinary if, whilst normally restricted to *Ceanothus*, a Vanessid larva should suddenly be found devastating alfalfa and garden vegetables. But in the case of the attack reported from Waldo, Oregon, the food-plants mentioned indicate that the larvae were probably those of *Vanessa californica*.

Meyer (H.). **Anmerkungen über Entwickelung von *Sitophilus (Calandra) granarius*, L.** [Remarks on the development of *Calandra granaria*.]—*Entomologische Zeitschrift, Frankfurt a.M.*, xxvii, no. 16, 19th July 1913, pp. 87-88.

The author succeeded in rearing two generations of this insect from specimens received from a malt factory in which they did much damage to stored barley. The beetles live for upwards of a year. They are very careful not to attack any grains of barley and rye which are already tenanted by larvae.

Green (E.). **Catalogue of Isoptera (Termites) recorded from *Ceylon*.**—*Spolia Zeylanica*, vol ix, part 33, 1913, pp. 7-15.

The author says that this list must not be taken as complete. Little attention has been given to this order of insects in Ceylon and collections have been made in a few localities only, so that probably the range of several species is more extended than it appears.

Hoffmann (—). **Obstbaumdüngung, ein Hilfsmittel im Kampfe gegen einige tierische Baumschädlinge und gegen ungünstige Witterungsverhältnisse.** [The manuring of fruit-trees, an aid in combating tree-pests and adverse climatic conditions.]—*Schweiz. Zeits. für Obst- und Weinbau, Frauenfeld*, xxii, no. 14, 22nd July 1913, pp. 218-220.

This paper, reprinted from the 'Deutsche Obstbauzeitung,' deals with an experiment made at Germersheim (Pfalz), where large numbers of plum trees were destroyed in 1912 owing to the ravages of *Scolytus pruni*, *S. rugulosus* and *Xyleborus dispar*. Experimental plots containing about 24 plum trees were manured with different fertilisers, with the result that on the plots treated with stable manure, potassium nitrate and nitro-phosphates all the trees were saved. Plots treated with potassium phosphate showed a loss of $8\frac{1}{3}$ per cent., with lime only, $16\frac{2}{3}$ per cent., whereas one-third of the trees untreated with manure were destroyed by insect pests. The trunks of the trees in all the plots were treated alike with lime-wash twice annually. The greater resistance of the manured trees may be due to the fact that their woody tissues grow more rapidly, thus causing the tunnels of the insect pests to be closed up. The influence of manuring on resistance to frosty weather is also discussed.

Bruner (L.). **South American Locusts** (*Acridoidea*). ii.—*Ann. Carnegie Museum, Pittsburgh*, viii, nos. 3-4, March 1913, pp. 423-506.

The paper is based chiefly on a collection of locusts made by J. Steinbach in eastern Bolivia and south-western Brazil. Altogether 130 species are described, and a number of synoptical tables of genera and species are included.

Baker (C. F.). **A Study of Caprification in** *Ficus nota*.—*Philippine Jl. Science*, viii, D, no. 2, April 1913, pp. 63-83, 4 figs.

The fact that Smyrna figs can only be produced through the agency of certain Chalcidoidea, which perform for the figs the act of cross-pollination, has for a long time been exploited for the building up of large businesses, *e.g.*, in California, involving many thousands of dollars. The careful investigation of the symbiotic relationship between plant and insect has brought many interesting facts to light, and superficial observations in Cuba and in Brazil had previously indicated to the author the astounding extent and the very varied possibilities of this subject. The number of known species of figs is said to be above five hundred. In many of these the character of the caprification phenomena varies widely, and many of the insects involved seem to be quite confined to certain species of figs.

The author had excellent opportunities for observing the caprification of *Ficus nota*, which is common throughout the Philippines, at Los Baños, and gives a full account of the process.

The following insects are noted as occurring in this species of fig. *Blastophaga nota*, sp. n., is the normal inhabitant of the gall flowers and the active caprifier. *Agaonella larvalis*, g. n., sp. n. is common in *F. nota* and probably a guest in its relation to the *Blastophaga*. *Sycophaga nota*, sp. n., is not at all common at Los Baños and probably a guest. *Sycoryctes philippensis*, sp. n., occurs in great numbers in November in gall figs and is probably parasitic in its relation to *Blastophaga*. The same may be said of *Philotrypesis ashmeadii*, sp. n. *P. similis*, sp. n., is common, and *P. collaris* occasional.

**El Gusano de la Sandia** (*Citrullus vulgaris*). [The Citrullus (Water Melon) Worm.]—*Boletin de Fomento, San José, Costa Rica*, no. 2, 1913, pp. 139-140.

This pest, *Diabrotica vittata* (?) attacks the young plants just as they are beginning to grow, the larva at the same time destroying the roots. Another beetle, *Crepidodera cucumeris*, also gnaws the upper surface of the leaves in irregular patches, and the larvae tunnel into the parenchyma. The following remedies are suggested against these pests:—Manuring with nitrate of soda, so as to cause the plants to grow rapidly and acquire a capacity for resisting the attack, and spraying the plants with Paris green in the proportion of 4 oz. in 50 gallons

of water, two or three times at intervals of a week. These plants are also said to be attacked by *Aphis gossypii*, and against this pest, which often accompanies those previously mentioned, spraying with a mixture of 1 part of petroleum and 20 parts of water is recommended; that is to say, if an arsenical spray has been used, say, on Monday, the plants should be sprayed on the Thursday with the petroleum mixture and the method kept up for two or three weeks.

HEIKERTINGER (F.). *Psylliodes attenuata*, Koch, der Hopfen- oder Hanf- Erdfloh. Pt. 2. [The Hop or Hemp Flea-beetle, *Psylliodes attenuata*, Koch.]—*Verh. der K. K. Zoologisch-botanischen Ges. Wien*, lxiii, nos. 3 & 4, 20th June 1913, pp. 98-136, 20 figs.

This paper forms a continuation of one bearing the same title by Prof. F. Tölg [see this *Review*, ser. A., p. 245]. Following the description of the morphological characters of *Psylliodes attenuata* is a discussion of the distribution of the species. It does not seem to occur in the extreme north or south of Europe, but has been recorded from England, France, Netherlands, Germany, Central Russia, Turkestan and Eastern Siberia; and from Northern and Central Italy, Croatia, Dalmatia, Servia, Bulgaria, Rumania, Southern Russia and Caucasus.

The hop flea-beetle is stated to feed only upon hop and hemp, and occasionally upon nettle. The author criticises Chittenden's characterisation of the American species (*P. punctulata*) as being a 'general feeder,' and is of the opinion that no palaearctic Halticine is polyphagous, each of the plant families mentioned by Chittenden having its separate species of flea-beetle, and that a different behaviour on the part of nearctic species is improbable.

The author reiterates the statement of Prof. Tölg that *P. attenuata* only produces one generation during the year. The habits, in particular the method of jumping, of this flea-beetle are discussed. The suggestion of Theobald that oviposition occurs in the hop cones and that the larvae live in them is incorrect. The opinion is expressed that a number of insects accused of being hop pests (*Chaetocnema concinna*, *Phyllotreta* sp.) are only casual feeders on that plant. The paper concludes with a résumé of control methods and a bibliography of the principal papers on *P. attenuata* and *P. punctulata*.

BIRD (H.). The Passing of the Hickory Nut?—*Jl. New York Entom. Soc.*, xxi, no. 2, June 1913, pp. 123-126.

Many hundred hickory trees in Rye, N.Y., are dead or dying owing to the attacks of the hickory bark borer, *Scolytus quadrispinosus*. The beetles emerge from the last days of June to the middle of July: they do not mate at once, but flock around the trees, or fly to new territory. They feed on the bases of the leaf petiole where they mine a cavity large enough to crawl into, and

this subsequently causes the leaf to fall. They often mate in these borings. Before ovipositing the females chew a hole through the bark to the sapwood, usually on the upper third of the tree. The boring is enlarged underneath the bark, and the eggs placed in this cell. The larvae hatch out about the middle of September, and remedial measures ought to be carried out before they start on their destructive work of girdling. A spray of whale oil soap is recommended as a repellant, but the safer method is to squirt gasolene with a small oiler into the holes leading to the egg cells. The beetles invariably select trees of weakened vitality.

Hood (J. D.). **Two New Thysanoptera from Porto Rico.**—*Insecutor Inscitiae Menstruus*, i, no. 6, Washington, June 1913, pp. 65-70.

Two species of thrips collected by T. H. Jones, of the Sugar Planters' Experiment Station at Rio Piedras, P.R., were identified by the author as *Heterothrips sericatus*, sp. n., and *Podothrips semiflavus*, sp. n. Specimens of the former were collected from flowers of guava (*Psidium guajava*) and the latter from 'para grass' or 'malojillo' (*Panicum barbinode*). Mr. Jones mentions that accompanying *P. semiflavus* between the leaf-sheaths and stalks of the grass, there occurred a scale-insect, identified by E. R. Sasscer as *Odonaspis* sp. Along with this scale occurred specimens of *Targionia sacchari* (Ckll.).

Busck (A.). **New Microlepidoptera from British Guiana.**—*Insecutor Inscitiae Menstruus*, i, no. 7, Washington, July 1913, pp. 88-92.

Among the Microlepidoptera received by the author from H. W. B. Moore, of British Guiana, the following may be of economic importance. *Cryptolechia flava*, Zeller, was bred from coffee at Mocha, B. G. The larva of *Blastobasis lecaniella*, sp. n., found at Nonpareil, B.G., feeds on scale-insects, *Lecanium* and *Ceroplastes*, on old roots of lime and guava. A *Gracilaria V.*, bred from 'pigeon-pea' in Georgetown, could be differentiated from *G. violacella*, Clem., which feeds on *Desmodium* in North America.

Meyrick (E.). **A Revision of New Zealand Pyralidina.**—*Trans. & Proc. New Zealand Inst.*, 1912, xlv, 9th June 1913, pp. 30-51.

The Pyralidina form 22 per cent. of the entire lepidopterous fauna of New Zealand, probably a larger proportion than in any other region, and a few of them are of great economic interest. *Meliphora grisella*, F., was found at Nelson and Christchurch, the larvae feeding on wax in beehives, to which they are often injurious, and on dried apples. The larva of *Hymenia fascialis*, Cram., occurring in Auckland, also in Australia and throughout the warmer parts of Asia, Africa and America, feeds on Cucurbitaceae (melons, &c.) in gardens. *Diplopseustis perieresalis* occurs

near towns (Auckland, Wanganui, Christchurch) and is probably attached to some cultivated plant. *Pyralis farinalis*, the larva of which lives on flour and corn-refuse, was found near Christchurch.

Fletcher (T. B.). **Rice-Bug.**—*Madras Agric. Calendar*, 1913-14, p. 21, 1 fig.

The Rice-bug (*Leptocorisa*), well known as "bambuchu" in South Kanara, is a slender greenish insect which often does great damage to paddy crops by sucking out the milky juice of the young grain, so that no proper grain is formed. When sufficiently numerous to do damage, the bugs are easily caught in hand-nets made of thin cloth and there crushed with a stone or stick. As the bugs also feed on the seeds of wild grasses, &c., all such weeds should be cleared away from field-bunds whilst the paddy is still young; otherwise the bugs will live on the grass and attack the paddy when it comes into ear.

Fletcher (T. B.). **Grasshoppers.**—*Madras Agric. Calendar*, 1913-14, p. 17, 1 fig.

The best remedy against grasshoppers is to catch them in bag-nets as soon as they are noticed to be doing damage, especially in the case of young crops. The net is a bag of cloth 3 or 4 feet wide by 2 feet at the mouth and 5 or 6 feet deep and tapering to a point behind. The mouth of the bag is fitted with two short bamboo poles at the sides to hold the bag with and a bamboo piece to support the lower edge. The end of the bag is weighted with a stone to prevent it blowing upwards. Two men should take the bag, holding it by the upper ends of the bamboo side-pieces, and should sweep it over the crop as quickly as possible, against the wind, if any be blowing. At the end of each run the grasshoppers may be shaken down into the bottom of the bag and destroyed.

Fletcher (T. B.). **Hairy Caterpillars** (*Kumblihula*).—*Madras Agric. Calendar*, 1913-14, pp. 36-37, 1 fig.

In some districts Hairy Caterpillars (*kumblihula*, *kamlipuchi*) do much damage to ground nuts, pulses, cholam, cumbu, &c. The moths generally appear when the first monsoon rains set in and lay their eggs on the leaves; the larvae hatched from these eggs (each female may lay several hundreds) pupate in the ground. If the caterpillars are coming on to crops after eating all the weeds on field-bunds or waste places, the crops may sometimes be saved by digging a narrow steep-sided trench around the edge of the field and strewing fresh leaves or branches in it; the trench must be examined every day, the caterpillars killed, and fresh leaves laid down. In districts in which these larvae occur regularly, the best plan is to catch the moths when they emerge after the first monsoon showers. They may be caught in light traps,

but the better, simpler and cheaper method is to let a boy with sharp eyes catch the white and sluggish moths. Hundreds may thus be killed in fields attacked the previous year, and the new crops saved.

**Birds: Friends and Foes.**—*Madras Agric. Calendar*, 1913-14, p. 37.

Chief among the Indian birds which eat noxious insects and which ought to be preserved by the farmer are:—The hoopoe, the common mynah, the orioles, the king crow, the crow-pheasant, the common kite, and all woodpeckers. On the other hand, the green parakeet eats grain and should be driven away.

Schneider-Orelli (O.). *Byturus fumatus.—Schweiz. Zeits. für Obst- und Weinbau, Frauenfeld*, xxii, no. 15, 8th August 1913, p. 240.

Young raspberries sent to the author for examination were infested with the larvae of *Byturus fumatus*. The adult beetles are responsible for the destruction of the raspberry blossoms, whereas the larvae feed on the fruit. The simplest remedy is to collect the beetles early in the morning during May and June by tapping the canes over a bag net.

Schneider-Orelli (O.). *Omaseus vulgaris.—Schweiz. Zeits. für Obst- und Weinbau, Frauenfeld*, xxii, no. 16, 22nd August 1913, p. 256.

In reply to a correspondent the author states that as *Omaseus vulgaris* chiefly feeds on other insects, worms and slugs, this beetle may be regarded as beneficial. But last year it was observed to gnaw large cavities into ripening strawberries, so that an encouragement of this species does not seem to be advisable.

Cox (A. J.). *Eleventh Annual Report of the Bureau of Science*, Manila, 1913, pp. 83, pl. 72.

Among the excellent photographs which illustrate this volume are several of entomological interest, such as pictures of the well equipped laboratories and entomology room; interior of the silk-house, showing ant-proof racks for the silk-worms; larva, pupa and adult of *Oryctes rhinoceros* and larvae of *Aspidomorpha miliaris*.

Mokrzecki (S. A.). ЯБЛОННАЯ МОЛЬ ЕЯ ЖИЗНЬ И МѢРЫ БОРЬБЫ СЪ НЕЮ [*Hyponomeuta malinellus*, Zell.: its bionomics and methods of fighting it]. Simferopol, 1913, 17 figs.

*Hyponomeuta malinellus* is found everywhere in Russia, but whereas in the northern and western provinces, as for example in

Russian Poland and Lithuania, where there are numbers of apple orchards, it is not a serious pest, it is a regular annual visitant and is very injurious in the southern and south-eastern provinces. Apart from its normal yearly appearance, it multiplies there periodically, about every ten years, in enormous numbers, these cycles being due, in the opinion of the author, to the rythmic incidence of the parasites. The greater multiplication of the insects has been attributed by others to dry years, but the author cites instances of very rainy years (1896 and 1905) in which the pest was very abundant. Outside Russia this insect is found everywhere in Europe, except England, where the sea climate is perhaps unfavourable to it.

In the Crimea this insect starts flying in the middle of June, increasing daily till about the end of that month, from which date to the end of July is its period of maximum; it then decreases rapidly, but solitary specimens may be found even late in August. The ovary of the female contains about 50 mature eggs and the process of oviposition, which is fully described, lasts about an hour. The eggs are laid in groups of about 15-50 and over them the female pours out a thick yellow slime, the larvae issuing about 20 days after oviposition and remaining for the next nine months, that is until the next spring, under the shield formed by the hardened slime. In the Crimea the eggs begin to hatch about the 23rd July. The caterpillars feed first on the matter forming the shield and afterwards, usually in the autumn and again in the spring, they gnaw the bark of the trees underneath it; during the winter they become torpid and are protected by the shields from cold and wet and from the attacks of enemies. The date of the issue of the caterpillars from the shields varies, coinciding with the unfolding of the first green leaves of the buds; during the last 12 years the earliest date was on the 22nd March in 1895, the latest 2nd May in 1896. The author describes the second stage in the life of the caterpillars, which starts after their appearance in the spring and lasts about two weeks. This is called " the mining stage," being passed by them inside the parenchyma of the leaves. From the end of April to the middle of May the caterpillars emerge from the parenchyma and then their third stage, which the author calls " the skeletonising stage," begins and lasts for about a week. After this they pass in large colonies to the ends of the branches where they settle down in a common web, gradually spreading and enlarging it in all directions. Their voracity in this stage reaches its maximum and they sometimes strip the trees in the course of a few days. The injured trees will bear no fruit that year and often also the next year and they require much attention, plenty of water, loosening of the soil round the roots and natural and artificial manuring to enable them to recover. By about the 2nd June the caterpillars are full-grown. The cocoons are massed together, usually in several layers. The first cocoons may be found in the Crimea on or about the 2nd June and the first perfect insects emerge about the middle of June. Two other species are also found in the Crimea, *H. cognatellus*, Hb. (*H. euonymellus*, Scop.) and *H. variabilis*, Z., (*H. padellus*, Hb.). The former insect was found there by the author only on *Prunus mahaleb*, although in Turkestan it also attacks apple trees.

The following list of parasites of *H. malinellus* is given:—

Tachinidae: *Sarcophaga affinis*, Fall., *Nemorilla notabilis*, Mg., and *Metopia tincta*, Mg.

Ichneumonidae: *Herpestomus* (*Ichneumon*) *brunnicornis*, Grv., *Pimpla examinator*, F., *P. stercorator*, Grv., *Chorinaeus tricarinatus*, Hlmg., *Exochus gravipes*, Grv., *E. mitratus*, Grv., *E. mansutor*, Grv., *Ascogaster annularis*, Nees, *Agrypon tenuicorne*, Grv., *Angitia armillata*, Grv.

Chalcididae: *Ageniaspis fuscicollis*, Dalm., *Pteromalus* sp. *Tetrastichus euonymellae*, Bouché.

The importance of these parasites in destroying the caterpillars of *H. malinellus* is enormous. *Herpestomus brunnicornis*, the largest of them, is not common in the Crimea and issues in the middle of June singly from the pupae of the moth. *Angitia armillata* lays its eggs singly in the body of the caterpillar, and the same applies to *Pimpla examinator*, which also parasitises *Carpocapsa pomonella* in the Crimea, and the species of *Chorinaeus* and *Exochus*. *Ageniaspis fuscicollis*, Dalm., lays about 50 eggs underneath the skin of the caterpillar.

The most primitive method of fighting the caterpillars is collection and destruction by hand, but the author does not recommend this method owing to its ineffectiveness and the damage done to the trees; and it is also expensive, the cost amounting to one rouble or more per tree for a double collection. This method can give practical results only in the case of dwarf or young trees. Instead of this, the author recommends the collection of the cocoons, which is more easily done, owing to the larvae pupating in large colonies. In order not to destroy the parasites, the author suggests collecting the cocoons and keeping them in wooden boxes covered with netting, the holes of which would allow the escape of the small parasites while arresting the moths.

Turning to insecticides, the author, in agreement with Portchinsky, doubts the effectiveness of tobacco extract as used now in the Crimea (Pastaks, containing 3·7 per cent. of nicotine and applied in a 2·6 per cent. solution in water), in destroying the caterpillars of *H. malinellus*, except in their earliest stage; while a stronger solution may prove injurious to the plants. He describes his experiments on the caterpillars in the mining stage, which he sprayed with a 1 per cent. solution of the tobacco extract, and with ½ per cent solution of kerosene emulsion, and also with ½ per cent. solution of barium chloride; after 24 hours the caterpillars sprayed with tobacco and kerosene were dead, while the barium chloride gave no useful results. The spraying of the plants at this period, as well as at the time of the unfolding of the buds, is of great practical value also against many other insects. For the later stages of the caterpillars Paris green is recommended; this is used in the Crimea in the following proportions:—1 lb. of green, 3–4 lb. of caustic lime and about 220–250 gallons of water. The author gives also a recipe recommended by Schreiner: 54 gallons of water, 12½ ozs. of Paris green, 25 ozs. of caustic lime and 4½ lb. of rye-meal. The lime must be made into a milk with water about half an hour before it is used; the green is then powdered in a copper or porcelain

mortar; the meal is boiled into a paste, and all this mixed carefully together in the prescribed amount of water, adding first the paste, then the lime through a sieve, and afterwards the Paris green.

"Azurgin," a combination of Paris green and copper salts dissolved in ammonia, is also useful and the following recipe is given. Four-and-a-half ounces of copperas are dissolved in 8 oz. of hot water and after the solution has cooled down ½ lb. of liquor ammoniae (sp. gr. 0·91) is added; then 1¼–1½ oz. of Paris green is dissolved in 4½ oz. of ammonia (this solution must be quite clear, otherwise the green is evidently not pure, which is very important); having prepared the above two solutions in glass bottles they are mixed together and about 25 gallons of water are added. In order to give sticky qualities to this insecticide a paste of rye-meal (2 to 3 lb.) can be added to it or the same quantity of treacle or gelatin (½ oz. to each 3 gallons of the insecticide). This insecticide not only kills the insects, but also checks fungus diseases, and is harmless to the plants.

"Djipsin" ($Pb_3(AsO_4)_2$) is used with good effect in many gardens in the Crimea. This insecticide is prepared by mixing Pb ($C_2H_2O_2$) $3H_2O$ or Pb ($NO_3$)$_2$ with a 50 per cent. solution of sodium arsenate. The following recipe is suggested:—10½ lb. of the first-named salt, 4 lb. of the second and 110–160 gallons of water. The advantages of this insecticide are: Its gravity being near to that of water, it remains in a state of suspension, which allows of its even distribution on the leaves; its white colour shows at once whether the plants have been sprayed or not; it remains on the plants for a longer time than the other insecticides. Its disadvantages are that a supply of pure salts of arsenic is not easily obtained, and the difficulty of preparing it. Arsenate of lime is obtained by boiling white arsenic with lime in water. The author quotes the following recipe suggested by Rogozin. In a boiler of about 4 gallons capacity 2·7 gallons of water are put and to this is added 1 lb. of arsenic and 1 to 2 lb. of potash or soda (the latter is cheaper); this is boiled till the arsenic is quite dissolved, then about 3 or 4 lb. of lime are added gradually and boiling is continued for ½–1 hour. This solution is then made up to 160–270 gallons of water.

Barium chloride when used in 1 per cent. or 2 per cent. solution (4½–6 lb. of barium in about 27–30 gallons of water) is considered to be the most effective. One of its disadvantages is the want of adhesiveness, to obtain which it is recommended by some authors to add potato syrup or a solution of resin in 90 per cent. spirit; while the author recommends the addition of soda (about ¼ lb. for the above quantity). The latter transforms some of the barium into $BaCO_3$, but in his opinion the amount of barium lost in this way is not important, besides it gives the solution a white colour, thus facilitating control of the spraying. Another disadvantage is that it burns the leaves of the trees; this, although very serious, can be minimised by careful and rapid spraying. The author states that during eight years' use of this insecticide under his direction there never was a case of poisoning either of the cattle feeding on the sprinkled grass or of birds.

Since 1907 the Zemstvo of Simferopol has made the fighting of this insect compulsory, leaving to the owner the choosing of the remedy. Should he fail to do this remedies are applied by the authorities and the cost charged to his account. The authorities further provide labourers skilled in spraying and also let out spraying apparatus for hire.

**Uganda Customs Consolidation Ordinance 1904; Removal of Prohibition of Importation of Coffee.**—*Uganda Official Gazette*, 31st July 1913.

The notice dated 22nd November 1910 which prohibits the importation of coffee plants (whether living or dead) and coffee, other than roasted beans and ground coffee, into the Protectorate, except with the consent of the Governor previously given in writing, has now been repealed.

Zacher (F.). **Notizen über Schädlinge tropischer Kulturen.** [Notes on pests of tropical cultivated plants.]—*Tropenpflanzer*, xvii, no. 3, March 1913, pp. 131-144, 12 figs.

The two species of Gryllidae, *Scapsipedus marginatus* and *Gryllus conspersus*, were found to damage young *Kickxia* plants in Kamerun by gnawing them round the base of the stem, causing them to die or break off. The former larger-sized species was found singly in holes in the soil round the rubber trees. The smaller species occurs in swarms and the damage is less noticeable in the rainy season.

The following pests of cotton in the Bismarck Archipelago, mentioned by Aulmann, have been received by the Kaiserliche Biologische Anstalt für Land- und Forstwirtschaft from Karagakaul:—*Telephorus basicornis*, *Mordella leucospila*, *Acolesthes ampliata*, *Phloeops platypennis*, *Dysdercus sidae*, *D. cingulatus*, *Tectocoris lineola* var. *cyanipes*, *Leptoglossus australis*, *Anomala aeneotincta*, *Phyllobius* sp. and, perhaps, *Sphingonotus yorkensis*.

According to a report from the Governor of Togo a considerable diminution of the cotton crop occurred in the Sokodé District in 1910-1911, whereas in 1911-1912 the crop was practically nil. Almost all the plants were observed to grow very well at first, but after about 3½ months the branches and the green parts of the stems began to blacken. The bolls either dropped off or showed a weak development, and a thickening was observed on the upper parts of the roots. The author found that this diseased state was not due to climatic and soil conditions, as had at first been suggested, but partly to boll-worms, probably *Diparopsis castanea*, and to two other pests, perhaps *Asthenes* sp. and *Sphenoptera* sp. Further cotton pests in Togo are *Apate monachus* and *Hypothenemus eruditus*. The best remedy against all these wood-borers is probably a spray recommended by Kränzlin, consisting of 11 lb.

sugar and ½ lb. Paris green in 8½ gals. of water. The young plants are to be sprayed when they are from 2 to 2½ feet high, and for a second time after 4 weeks. The disadvantages of the spray are its poisonous nature and the damage it causes to the leaves. Lead arsenate may on the whole be more advisable.

Mention is made of the value of the recent book by L. Peters and M. Schwartz on diseases of and damage to tobacco.

Finally the author describes the damage done to the valuable timber-tree *Monotes kerstingii* in Northern Togo by a species of *Sylepta*. The caterpillars appear in very large numbers, and will probably prove a dangerous enemy to African forestry in the future.

Brèthes (J.). **Description d'un nouvel Hymenoptère du Chili.** [Description of a new Hymenopteron from Chile.]—*Revista Chilena de Historia Natural*, xvii, nos. 1 & 2, April 1913, p. 34.

A parasite of the rose aphis was referred to the author who identified it as *Aphidius chilensis*, sp. n.

Porter (C. E.). **Notas para la zoología económica de Chile (iv).** [Notes on economic zoology in Chile (iv).]—*Revista Chilena de Historia Natural*, xvii, nos. 1 & 2, April 1913, pp. 98-99.

Prof. Porter records two insects new to the Chilian fauna which are beneficial to agriculture. One is *Coccidophilus citricola*, Brèthes, which near Santiago is controlling several species of *Aspidiotus* and was originally described as preying on *Lepidosaphes beckii*; the other is an *Aphelinus* parasitising Coccids and Aleurodids.

Hagedorn (M.). **Borkenkäfer (Ipidae), welche tropische Nutzpflanzen beschädigen.** [Bark beetles which damage tropical economic plants.]—*Der Tropenpflanzer*, xvii, no. 1, January 1913, pp. 43-51; no. 2, February 1913, pp. 99-104; no. 3, March 1913, pp. 154-160; no. 4, April 1913, pp. 211-216; no. 5, May 1913, pp. 266-270, 19 figs.

Betel (*Areca catechu*): *Coccotrypes dactyliperda*, F. (German E. Africa, Asia and Europe); *Stephanoderes arecae*, Hornung (East Indies).

Cacao (*Theobroma cacao*): *Eurydactylus sexspinosus*, Mots., *Xyleborus fornicatus*, Eich., *X. semigranosus*, Blfd., *X. discolor*, Blfd., *X. mancus*, Blfd. (Ceylon); *X. confusus*, Eich. (Petershafen, New Guinea); *X. destruens*, Blfd. (Java, Gilolo); *Coccotrypes graniceps*, Eich. (Japan, Philippines).

Camphor-tree (*Laurus camphora*): *Xyleborus camphorae*, Hag. (Mauritius).

Cardamom (*Elettaria major*): *Coccotrypes cardamomi*, Schaufuss (Ceylon).

Cinchona: *Ips* (*Tomicus*) *cinchonae*, Veen (Java).

Coffee (*Coffea* spp.): *Eurydactylus sexspinosus*, Mots. (Ceylon, Burma, Sumatra, Kamerun); *Xyleborus coffeae*, Wurth (Java, Tonkin); *X. morstatti*, Hag. (German East Africa); *Stephanoderes coffeae*, Hag. (Uganda, Angola, Belgian Congo, Java); *S. hampei*, Ferrari (Antilles, Java); *Ctonoxylon amanicum*, Hag. (Kamerun); *Stephanoderes aulmanni*, Hag., on *Coffea bukowensis* (German East Africa).

Cotton (*Gossypium* spp.): *Hypothenemus eruditus*, Westwood (Togo, North America, Hawaii, New Caledonia, Guinea).

Date-Palm (*Phoenix dactylifera*): *Coccotrypes dactyliperda*, F. (Africa, Asia, Europe).

Doum-Palm (*Hyphaene* sp.): *Coccotrypes dactyliperda*, F. (German East Africa); *C. pygmaeus*, Eich., on *H. guineensis* (Kamerun).

Ebony-tree (*Diospyros ebenum*): *Coccotrypes integer*, Eich. (Ceylon).

Ivory-Plant (*Phytelephas macrocarpa*): *Coccotrypes eggersi*, Hag. (Ecuador).

Jalap-Plant (*Ipomoea purga*): *Cryphalus jalappae*, Letzner (Mexico).

Mahogany: *Xyleborus gravidus*, Blfd., *Scolytoplatypus brahma*, Blfd. (Chittagong); *Trigonogenius fallax*, Hag., on *Khaya senegalensis* (German East Africa).

Nutmeg-Tree (*Myristica fragrans*): *Xyleborus fornicatus*, Eich., *Phloeosinus cribratus*, Blfd. (Penang); *Stephanoderes moschatae*, Schauf. (Guadeloupe).

Rice (*Oryza sativa*): *Eurydactylus sexspinosus*, Mots. (Lower Burma).

Rubber (*Hevea brasiliensis*): *Stephanoderes congonus*, Hag., *S. heveae*, Hag., *Hypothenemus tuberculosus*, Hag. (Congo); *Xyleborus affinis*, Eich., *X. ambasius*, Hag., *X. camerunus*, Hag. (Kamerun); *X. cognatus*, Blfd. (Tonkin, Kamerun).

Rubber (*Manihot glaziovii*): *Phloeotribus puncticollis*, Chap. (Brazil, Ecuador); *Xyleborus affinis*, Eich. (Hawaii); *X. confusus*, Eich. (Belgian Congo).

Rubber (*Castilloa elastica*): *Phloeotribus puncticollis*, Chap. (Brazil, Ecuador); *Xyleborus spathipennis*, Eich. (Ecuador).

Rubber (*Ficus elastica*): *Diamerus fici*, Blfd. (Eastern Himalayas).

Rubber (*Urostigma* sp): *Cryptarthrum walkeri*, Blfd. (Dammar Islands).

Sugar-Cane (*Saccharum officinarum*): *Xyleborus affinis*, Eich. (West Indies); *X. perforans*, Woll. (Java); *Hypothenemus eruditus*, Westwood (Nevis).

Tea (*Thea chinensis*): *Xyleborus fornicatus*, Eich. (Ceylon).

Morgan (A. C.) & Parman (D. C.). **Arsenate of Lead as an Insecticide against the Tobacco Hornworms.**—*U.S. Bureau of Entomology*, Circular no. 173, 27th May 1913, 10 pp.

The use of Paris green against tobacco hornworms (*Phlegethontius* sp.), which are a serious pest in the dark-tobacco districts of Kentucky and Tennessee, is not to be recommended, as it burns the leaves of tobacco very severely, and may reduce the value of the crop as much as 50 per cent. in exceptional cases. Instead, it is advisable to use lead arsenate, 3 to 4 lb. in 100 gals. of water, if applied as a spray, or 3½ to 5 lb. per acre, if applied in powdered form. In the latter case the lead arsenate must be mixed with a carrier, the best so far known being dry wood ashes, used in a bulk at least equal to the lead arsenate. In applying the lead arsenate powder it is necessary to use a dust-gun having a diameter of at least eight inches and to apply the powder when there is no breeze and when the dew is on the plants.

Marsh (H. O.). **The Striped Beet Caterpillar.**—*U.S. Bureau of Entomology*, Bull. no. 127, pt. ii, 19th May 1913, pp. 13-18, 2 figs., 1 pl.

Ordinarily the so-called garden Mamestra or clover cutworm (*Mamestra trifolii*, Rott.) is one of the minor beet pests in the Arkansas Valley in Colorado and Kansas, but during some years it causes considerable damage. In that locality the larvae were only found on sugar beet which is the favourite food-plant, and on lamb's quarters (*Chenopodium album*).

There are three generations of *Mamestra trifolii* in the Arkansas Valley each year. The first moths are to be found during the latter half of May. These deposit eggs from which a generation develops during the first part of July. Eggs deposited by the July generation produce moths during the latter part of August and in early September. The larvae of the third generation mature in late autumn, and the pupae live through the winter in cells in the soil. Adults develop from these pupae during the latter half of May of the following year.

The ploughing out of the beets at harvest time breaks open many of the pupal cells and is an efficient check. Cold weather is also instrumental in killing the pupae. At Rocky Ford, Colorado, the following parasitic and predaceous enemies of the striped beet caterpillar have been recorded: *Microdus inedius*, Cress., *Meteorus* sp., *Phorocera claripennis*, Macq., *Perilloides bioculata*, F., and the spider *Phidippus coloradensis*, Thorell.

The striped beet caterpillar is easily killed by arsenicals and is therefore quickly controlled by a spray (75 to 100 gals. per acre) consisting of 3 lb. of Paris green and 6 lb. of whale-oil soap in 100 gals. of water.

# NOTICES.

The Review of Applied Entomology is intended to contain, month by month, abstracts of the latest information published concerning insects injurious to man or animals, as the carriers of disease; and to forests, fruit trees, crops or stored merchandise.

The Editor will be glad to receive prompt information of the appearance of new pests, or of known pests in districts which have hitherto been free from them, and will welcome any suggestion, the adoption of which would increase the usefulness of the Review.

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